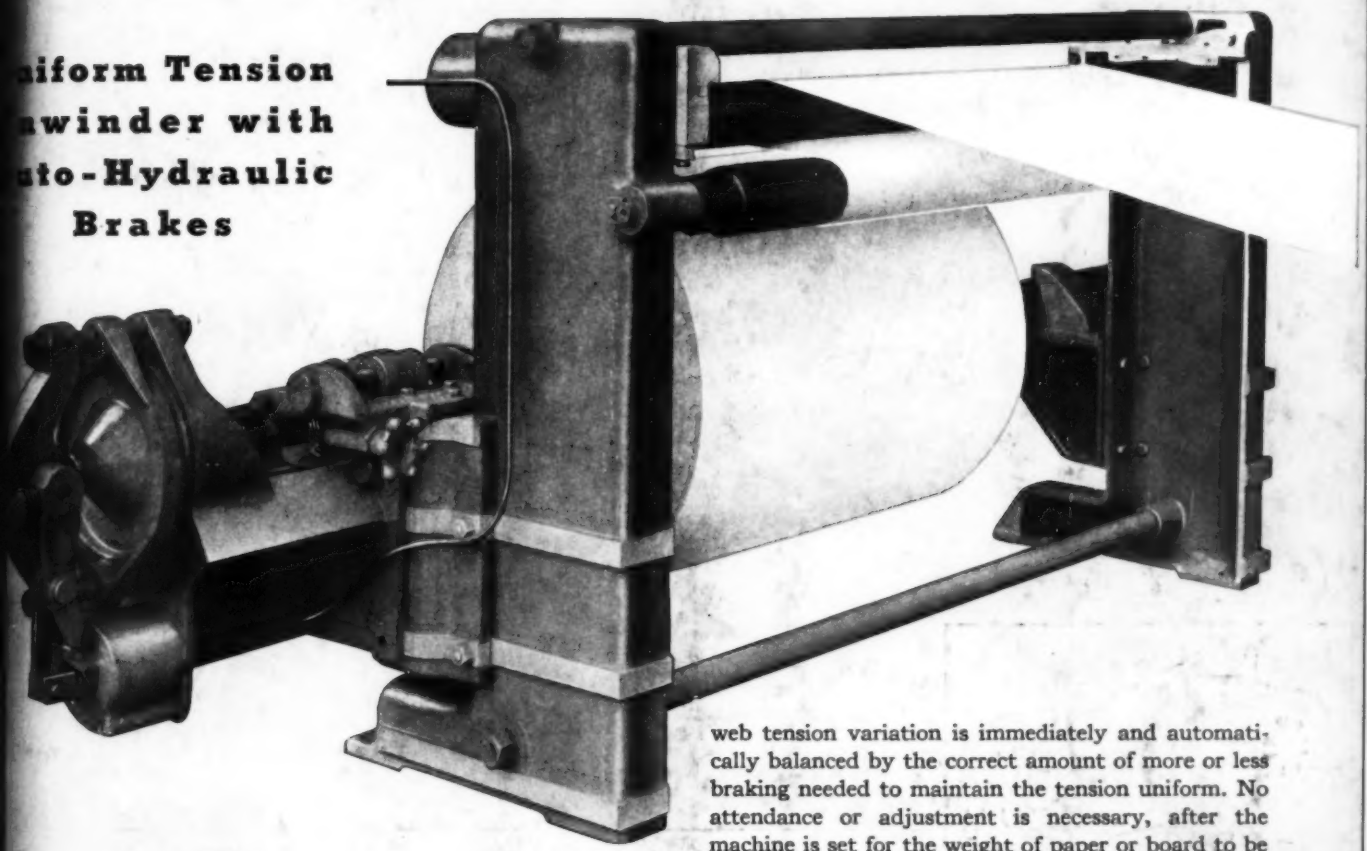
THE PAPER INDUSTRY
and PAPER WORLD
AN EDUCATIONAL NEWS MAGAZINE—SEPTEMBER, 1942

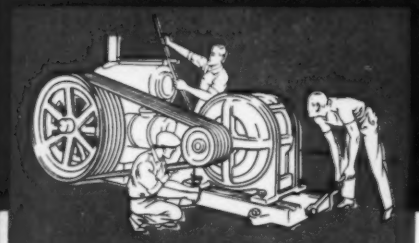
Uniform Tension Unwinder with Auto-Hydraulic Brakes



THE Johnstone Uniform Tension Unwinder practically "thinks for itself" in continuously maintaining the web tension uniform, regardless of the speed or diameter of the roll being unwound. The Auto-Hydraulic Brake controls the unwinding roll and the physical condition of the unwinding roll controls the brake. When the pull is strong, the Nerve Roll and Tensioneer cause the brake friction to be released and when the pull is light, they cause more friction to be applied to the Auto-Hydraulic Brake. (Auto means "automobile type" hydraulic brake, "automatically operated.") The Nerve Roll and Tensioneer are so sensitive that 1½ lbs. tension on the web will produce a pressure of 1200 lbs. on the brake, thus the slightest web tension variation is immediately and automatically balanced by the correct amount of more or less braking needed to maintain the tension uniform. No attendance or adjustment is necessary, after the machine is set for the weight of paper or board to be handled. This set-up adjustment is merely the adding or removing of weights to set the tension desired. . . . Write for Bulletin No. 641, which completely describes this super-sensitive, pull-balancing automaton.

JOHNSTONE
Engineering & Machine Co.
DOWNINGTOWN, PA.

ROCKWOOD *automatic* *belt tightening* MOTOR BASES



STOP DOING THIS

It is no longer good practice to move the motor back to tighten the belts. Such relief from belt slip is only temporary and, as the belts are usually tightened more than is necessary, they wear out just that much faster. THE MODERN PRACTICE is to let the Rockwood pivoted motor base AUTOMATICALLY keep the belts at just the right tightness—regardless of belt stretch or changes in load.

THE IDEAL DRIVE FOR BEATERS

No matter whether you prefer flat belts or multiple V-belts your beater will do better work if the motor is mounted on a modern Rockwood Pivoted Motor Base.

The drive efficiency will be upped, driven speeds will be maintained without drops and *your beater will do more and better work.*

Send us data on your motor driven beaters and we will make recommendations and quote prices—delivering promptly from stock. For any size motor.

Hundreds of mill superintendents, mill-wrights and engineers already have proven to their own satisfaction that this simple, inexpensive change gives them improved beater performance and is a real money saver.

ROCKWOOD MANUFACTURING CO., INDIANAPOLIS, IN

HIS JOB'S ON THE FACTORY FRONT!

Howard Hoag served for 18 months in the navy during World War I. Today, like other expert machinists at Beloit, he's "fighting" on the *factory* front! Beloit's engineering skill, manpower and machines are enlisted in war production for the duration. At the same time, every effort is made to provide the essential repair and maintenance parts you require. Paper, too, is needed to win a war!

SERVING UNCLE SAM 1ST FOR THE DURATION

BELOIT

WHEN YOU BUY BELOIT . . .

YOU BUY MORE THAN A MACHINE!

BELOIT IRON WORKS, BELOIT, WIS.

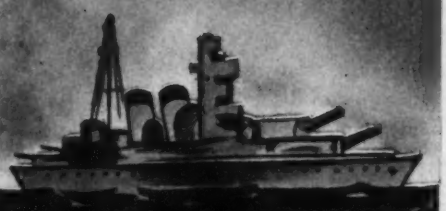
ON LAND AND SEA AND IN THE AIR

men are risking their lives to safeguard the nation's life and the ways of liberty.

To deprive them of anything necessary in their fight for these aims is unthinkable.

That they may not be deprived of rubber, a vital necessity to them, you, its distributors and dealers, are called on to sacrifice a substantial amount of your regular civilian needs.

In war, morale is as important as material. We know that you have contributed both and will continue to do so until the battle for liberty is won.

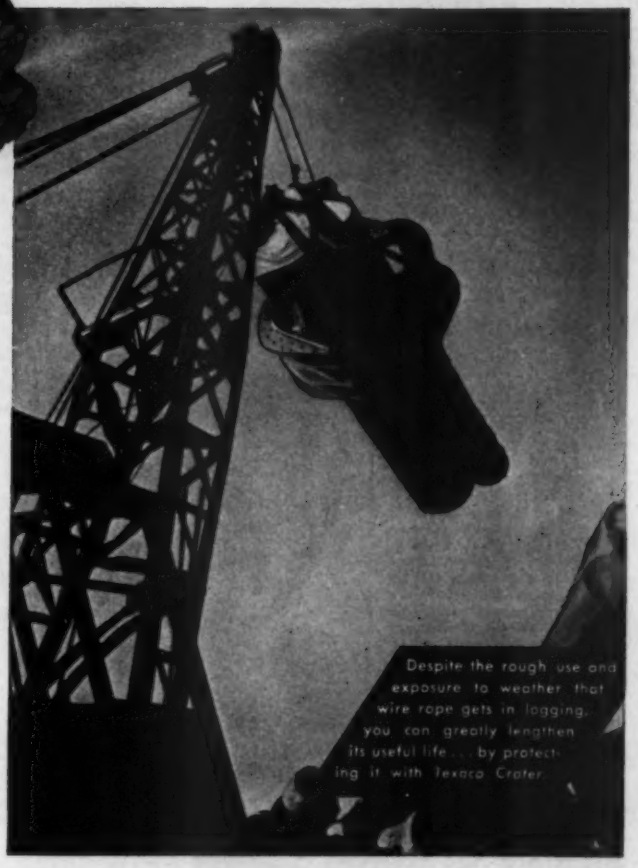


BOSTON WOVEN HOSE & RUBBER COMPANY

CAMBRIDGE, MASS.

Longer Rope Life

THE INSIDE STORY


Despite the rough use and exposure to weather that wire rope gets in logging, you can greatly lengthen its useful life . . . by protecting it with Texaco Crater.

NO MATTER how severe the conditions in logging or in the mill yard, you can count on longer, uninterrupted service from your wire rope . . . when you protect it with *Texaco Crater.*

Texaco Crater completely penetrates wire rope, preserving the core, coating each wire in a tough, viscous, lubricating film. It cuts down internal and external wear, seals out moisture, prolongs rope life.

The outstanding performance that has made Texaco preferred in the fields listed in the panel has made it preferred in the logging operations of prominent pulp and paper mills everywhere.

These Texaco users enjoy many benefits that can also be yours. A Texaco Lubrication Engineer will gladly cooperate . . . just phone the nearest of more than 2300 Texaco distributing points in the 48 States, or write to The Texas Company, 135 East 42nd Street, New York, N. Y.

Care for your Car ...for your Country

Tune in the TEXACO STAR THEATRE every Sunday night—CBS

THEY PREFER TEXACO

★ More buses, more bus lines and more bus-miles are lubricated with Texaco than with any other brand.

★ More stationary Diesel horsepower in the U. S. is lubricated with Texaco than with any other brand.

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★ More locomotives and cars in the U. S. are lubricated with Texaco than with any other brand.

★ More revenue airline miles in the U. S. are flown with Texaco than with any other brand.

TEXACO

TEXACO Lubricants and Fuels

FOR THE PAPER INDUSTRY

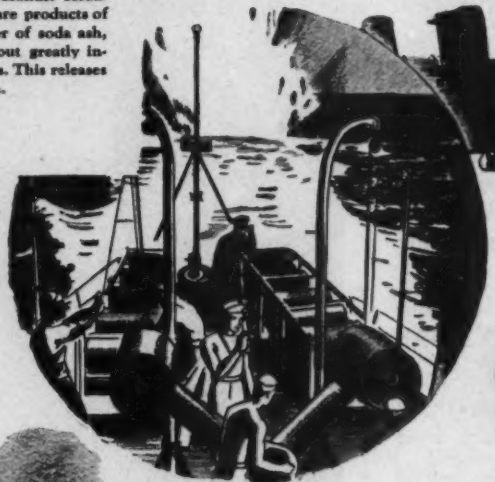
HELP WIN THE WAR BY RETURNING EMPTY DRUMS PROMPTLY

SODA ASH

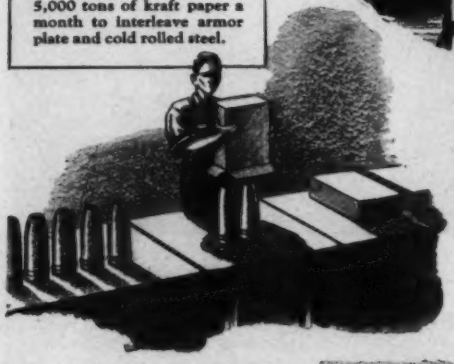
—an unseen power behind America's offensive!

JEEPS WITH GLASS EYES. Jeeps are rolling off U. S. production lines by the thousands. Headlamps and bulletproof windshields are products of the glass maker. Largest single user of soda ash, the glass industry is also turning out greatly increased quantities of glass containers. This releases vital tin and steel for war production.

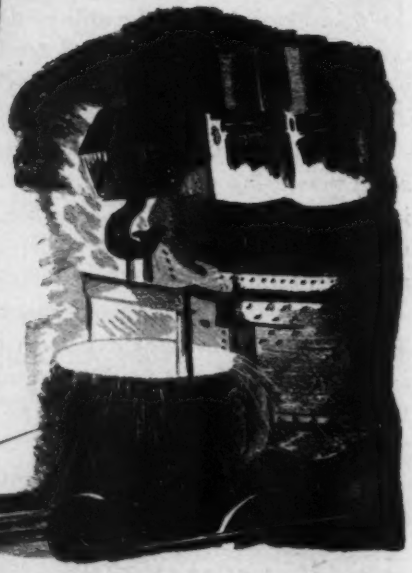
THE BEST-DRESSED ARMY IN THE WORLD—Wherever it goes—into the steaming jungles of the southwest Pacific or to the freezing shores of Iceland—the American army is clothed in the finest uniforms to be found on any battlefront. In processing millions of yards of cotton, rayon and woolen cloth for U. S. military uniforms, the textile industry uses thousands of tons of soda ash.



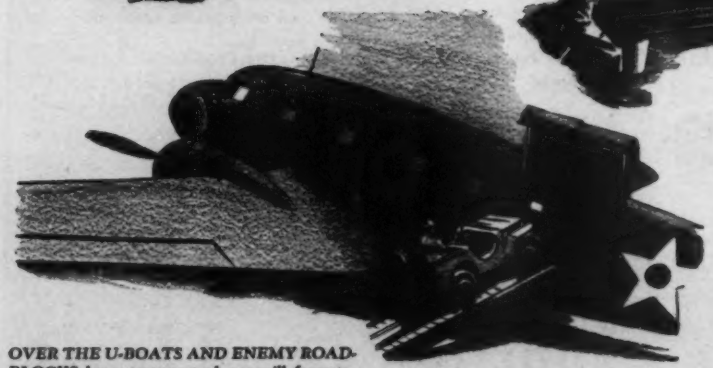
SHELLS FOR HARD-HITTING 75's move along conveyor belts to stapling machines where they are sealed in cartons for shipment. Ordnance plants alone use 30,000 tons of paper every month for packaging shells. A major consumer of soda ash, the paper industry also supplies steel mills with 5,000 tons of kraft paper a month to interleave armor plate and cold rolled steel.



DEPTH BOMBS ASTERN! Nazi U-boat commanders have learned to beware of the rear end of U. S. destroyers. Their depth charges carry a sting that can rip a submarine wide open. A prime processing agent in the manufacture of "TNT" and other high-explosives, soda ash is helping America carry the offensive to the enemy.



AN AMERICAN GIANT THE ENEMY FEARS. The U. S. iron and steel industry produces a greater tonnage of metal than all the Axis countries combined. In iron foundries and steel mills, soda ash plays an important role in the production of more and better iron and steel castings.



OVER THE U-BOATS AND ENEMY ROADBLOCKS huge transport planes will ferry tomorrow's lend-lease materials to distant allies hemmed in by fire and steel. In the production of aluminum, from which these cargo planes are being fabricated, soda ash is an important processing agent. It is used to treat the bauxite ore from which pure aluminum is derived.

MATHIESON CHEMICALS

THE MATHIESON ALKALI WORKS, INC.

60 E. 42ND STREET, NEW YORK, N. Y.

LIQUID CHLORINE...SODA ASH...CAUSTIC SODA...BICARBONATE OF SODA...BLEACHING POWDER...HTH PRODUCTS...AMMONIA, ANHYDROUS and AQUA...FUSED ALKALI PRODUCTS ...SYNTHETIC SALT CAKE...DRY ICE...CARBONIC GAS...SODIUM CHLORITE PRODUCTS

THE PAPER INDUSTRY and PAPER WORLD

VOLUME 24 — SEPTEMBER, 1942 — NUMBER 6

Published monthly by
FRITZ PUBLICATIONS, INC.
59 E. Van Buren St., Chicago, Ill.

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Member:
Audit Bureau of Circulations
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Entered as second class matter June 29, 1938, at the post office at Chicago, Ill., under the Act of March 3, 1879. Subscriptions in the United States, U. S. Possessions, Canada, Cuba and Mexico, $2.00 for one year or $3.00 for two years. All other countries $3.00 for one year, or $5.00 for two years.

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THE PAPER INDUSTRY and PAPER WORLD is indexed regularly in *The Industrial Arts Index*. An index to each volume is issued annually by the publisher as Section Two of the April number.

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...and the DESIGN of APPLETON FELTS has kept pace with the PROGRESS in PAPERMAKING

Technical foresight in the design of Appleton Felts as the first step in their manufacture has kept Appleton Felts in step with the progress in the paper industry. In 1890, when Appleton Felts were first designed and made, the requirements in felts were few. Today high speed production exacts everything plus, and to be preferred by mills, felts must fully come up to these exactions. Since 1890 Appleton Felts have met all requirements of paper mills—today the standard for those characteristics mills prefer in felts.

makes APPLETON FELTS good paper

Appleton Woolen Mills

APPLETON • WISCONSIN

Saved! 80 pounds of rubber and $242.90

GET rubber transmission belts without priorities! The B. F. Goodrich Plylock splice and vulcanizer may help you manufacture new belts from the old worn ones in your plant. Here's how an Ohio paper mill did it—

Most B. F. Goodrich distributors have equipment and trained men ready to give you the added belt life the Plylock splice offers.

They had an old 32-inch 8-ply belt 56 feet long. They badly needed a 20-inch 6-ply endless belt 42 feet long.

They called in a B. F. Goodrich distributor and here's what he did. The top and bottom plies of the old belt were worn; he stripped them off. He slit the belt into 20-inch and 12-inch widths.

The 20-inch width was spliced by the B. F. Goodrich Plylock method into the needed 42-foot endless belt. The 12-inch width was slit again and made into 112 feet of 6-inch 6-ply belting for smaller drives.

Two belts nearly as good as new—for less than $50. New belting would have cost $279 and used up 80 pounds of crude rubber. Saving to the plant was $242.90. Saving to the nation, 80 pounds of critical rubber.

By the Plylock method belts can be made endless on the machine if you wish, with no dismantling.

The Plylock splice was developed by B. F. Goodrich engineers to make any flat belt endless, on the drive if you wish. In hundreds of cases it has increased belt life as much as two and three times.

Most B. F. Goodrich distributors are equipped to supply this Plylock splice service that can make new belts from old. Call the one near you. FREE: Set of seven pamphlets, "How to Get the Most Service Out of Industrial Rubber Products." Ask for as many sets as you need for all your employees responsible for care and maintenance. *The B. F. Goodrich Company, Industrial Products Division, Akron, Ohio.*

B.F. Goodrich

FIRST IN RUBBER

FOR VICTORY TODAY AND SOUND BUSINESS TOMORROW

Get This Flag Flying Now!

This War Savings Flag which flies today over companies, large and small, all across the land means *business*. It means, first, that 10% of the company's gross pay roll is being invested in War Bonds by the workers voluntarily.

It also means that the employees of all these companies are doing their part for Victory . . . by helping to buy the guns, tanks, and planes that America and her allies *must* have to win.

It means that billions of dollars are being diverted from "bidding" for the constantly shrinking stock of goods available, thus putting a brake on inflation. And it means that billions of dollars will be held in readiness for post-war readjustment.

Think what 10% of the national income, saved in War Bonds now, month after month, can buy when the war ends!

For Victory today . . . and prosperity *tomorrow*, keep the War Bond Pay-roll Savings Plan rolling in *your* firm. Get that flag flying now! Your State War Savings Staff Administrator will gladly explain how you may do so.

If your firm has not already installed the Pay-roll Savings Plan, *now is the time to do so*. For full details, plus samples of result-getting literature and promotional helps, write or wire: War Savings Staff, Section F, Treasury Department, 709 Twelfth Street NW., Washington, D. C.

Save With

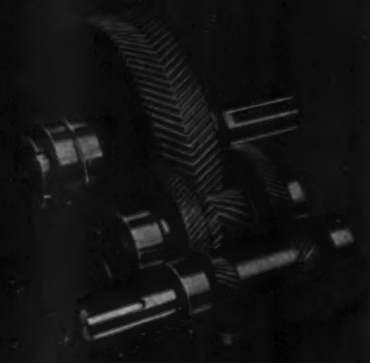
War Savings Bonds

This Space Is a Contribution to America's All-Out War Program by
THE PAPER INDUSTRY AND PAPER WORLD

To help you solve THE PRODUCTION PROBLEM

JONES WORM-HELICAL SPEED REDUCERS for vertical shaft drives

● These machines fill a long felt need for double reduction units of the fully enclosed type to be used for agitators, mixers, ore roasters, bending rolls, etc., requiring a vertical shaft drive. Built in standard ratios in various types of assemblies ranging from 40 to 1 to 250 to 1 for all common motor speeds and a wide range of horsepower ratings. Jones Bulletin No 75 covers complete details.



JONES HERRINGBONE SPEED REDUCERS

● Jones Herringbone Speed Reducers are built in single, double and triple reduction types with a large range of ratios and ratings making it possible to fulfill all ordinary requirements by the selection of standard units.

All these reducers have heat treated gears, ground shafts and are mounted with anti-friction bearings throughout.

Catalog No. 70 contains 128 pages of detailed information on the application of these speed reducers.

"JONES DRIVES FOR INDUSTRY"

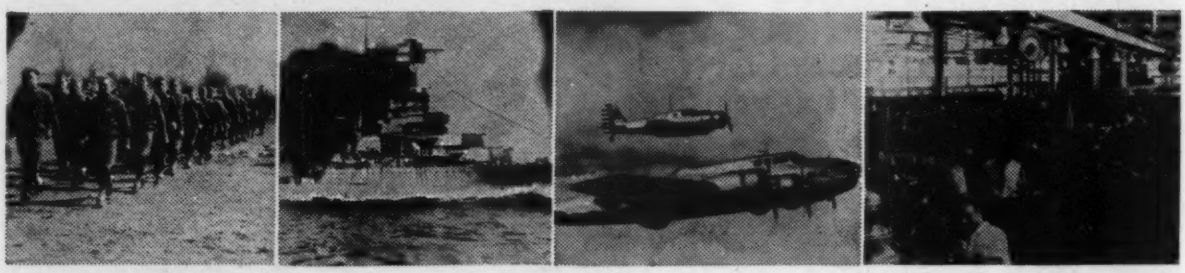
is the title of a 16-page bulletin that may be helpful in giving you a broad picture of the Jones products, engineering services and manufacturing facilities that are available.

Just ask for Bulletin No. 80

W. A. JONES FOUNDRY & MACHINE CO.
4439 Roosevelt Road, Chicago, Illinois

HERRINGBONE — WORM — SPUR — GEAR SPEED REDUCERS • PULLEYS
CUT AND MOLDED TOOTH GEARS • V-BELT SHEAVES • ANTI-FRICTION
PILLOW BLOCKS • FRICTION CLUTCHES • TRANSMISSION APPLIANCES

LABOR *drives for* VICTORY*



"Free Labor Will Win" was chosen by labor as its slogan for 1942 to symbolize its fight for victory in in this crucial war year.

Labor Day had its origin in [illegible] mber 2 as its Labor Day. the first Labor Day parade pa[illegible] d Queensland observe the first of New York City, September 5, [illegible] he first day of May is observed first Labor Day bill was introduce[illegible] m countries and Latin America. legislature and it was passed later [illegible] ralia observes April 21 as its "Eight- ever. Oregon passed the first Labo[illegible] and New South Wales and South February 27, 1887. Labor Day is now [illegible] ve their similar days in October.

[illegible] world torn by a battle for freedom, this day in each of the States and Territories, [illegible] abor Day slogan becomes the nation-wide legislative enactment or, as in Wiscon[illegible] cry of production. For free men know that Wyoming, through proclamation by the go[illegible] Labor WILL Win" the War, and all people of Canada followed the United States with its ho[illegible] nations of the earth will thereafter work, worship, on the first Monday in September, and Newfoun[illegible] nd live their lives in peace.

(*) This title appeared on the cover of the Special Supplement of the Chicago Sun, September 7, 1942. It is reprinted here through the courtesy of the Sun.

TRADE WINDS

NEW PAPER BASE PLASTIC

▶▶▶ PAPER AS THE BASE MATERIAL of a plastic which, as it is now conceived, may prove a revolutionary factor in the construction of airplanes, is revealed by the disclosure of some details of a new process plastic pioneered by Consolidated Water Power & Paper Company of Wisconsin Rapids, Wisconsin, and the Federal Government's Forest Products Laboratory at Madison, Wisconsin.

Announcement of the new plastic was made in August. Because of the critical relationship which the product may ultimately bear to a vital wartime industry, exact nature of the plastic and details of its composition were withheld both by the laboratory and by the company. Their joint statements, however, were sufficient to warrant belief that the experimental stage has been successfully passed, and that a new field for paper may be rapidly opened up under impetus of the war effort.

It is claimed for the new material that it equals aluminum in tensile strength on a weight basis, thus indicating its use for such structural parts of aircraft as wing ribs, wing tip skins, and control surfaces. The announcement by Consolidated and the laboratory said:

"Experimental data thus far obtained in laboratory tests indicate that the product has twice as high tensile strength as any paper laminated plastic heretofore produced; that it can be molded to desired shape at temperatures and pressures and on equipment now used for making plywood; also that it is resistant to moisture and remains extremely stable at both high and low temperatures, and that it is more resistant to scratching and denting than aluminum.

"The plastic has a smooth surface, eliminating the necessity of special finishes and coatings. Tests also indicate that it is not corroded by salt water and that it does not, when pierced by bullets, splinter, tear or 'flower out.'"

The McDonnell Aircraft Corporation, of St. Louis, has begun experimental production of plane parts. The U. S. Army and Navy departments are understood to be giving the material close attention, and are following the development of its possibilities in the manufacture of other war weapons as well. Properties exhibited thus far may show such uses for the plastic as employment in watercraft and flying boat hull construction.

Consolidated officials, including the company's employees who have been working on the plastic experiments for the past year, have been in St. Louis to confer with the McDonnell company and representatives of the War and Navy departments. Since the first authoritative announcement nothing has been said officially, but George W. Mead, president of Consolidated, keynoted the concerted effort which is being undertaken to bring the product to perfection when he said:

"We are extending every facility available to the end that full production schedules are attained at the earliest possible date."

Playing important roles in the plastic experiments are Gilbert K. Dickerman, Consolidated technical director; W. F. Thiele, chief engineer; E. M. McCourt of the company's production and sales division, and F. Harold Murtfeldt, assistant secretary. The personnel of Forest Products Laboratory engaged in the collaborative work have not been made known, but Mr. Mead praised their efforts highly.

Should ultimate results of the development justify the hopes of the moment, Consolidated will have made a second major contribution to the paper industry within a decade. The company's process for making and coating paper in one operation is now an established factor in the publishing world and is responsible in large measure for the ability of the publishers of *Life* magazine to produce a large weekly at a popular price.

On that development, Mr. Mead once said that Consolidated "was doing for the paper and publishing industries what Henry Ford did for the automobile industry." The cheap coated paper has brought better printing and better illustration within the reach of the popular market. Figures in the paper industry are recalling his prophetic words at that time, and applying their implication to the field of aviation in the wartime present and the future days of peace.

"It is gratifying to recognize that Consolidated paper has been selected after this long period of experimentation and it is a tribute to those who have diligently carried on the experiments and the men who have produced the product which has proved to be so successful in the development of the new plastic material," Consolidated's head declared.

"We all see great possibilities in this new product which will take the place of aluminum and other heavier and scarcer materials in the fabricating of airplanes, watercraft of all kinds and perhaps a score of other fields. By replacement of metals with this new product, implements of war will be produced at greater speed and may become more efficient than those in which conventional materials are used, and we shall have contributed to the speeding of the war effort and hastened the day of final victory."

◆

CHAMPION SOLVING SLIME PROBLEMS WITH MERFENEL

The Champion Paper and Fibre Company, Hamilton, Ohio, announces that in addition to his other duties, H. R. Murdock, director of research, has taken over the management of the Hamilton Laboratories (which is controlled by the Champion company).

The company is said to be having some wonderful results with its new product Merfenel, which has a special application to the industry for the solution of its slime problems. The Canton (North Carolina) plant has not shut down for slime since it began the use of this product June 1. Merfenel is being sold exclusively through R. T. Vanderbilt Company, Inc., New York City.

FINANCIAL

Financial reports from paper mills for the first half of 1942 are almost unanimous in showing increased gross earnings but net profit greatly reduced as compared with the first half of 1941. The reduced net income is universally due to the infinitely higher taxes imposed as the War developed.

American Box Board Company—Net income for 24 weeks to May 16, 1942, was $158,933 as compared with $107,226 for the comparable period in 1941.

American Writing Paper Corporation—Net profit for the first six months of 1942 was $203,304 as against $95,734 for the same period in 1941.

Brown Company—Because of the successful operations of the company in the past two years, the Reconstruction Finance Corporation has waived provisions as to payment of bond interest, and bondholders have been paid six months' interest on their 5 per cent bonds for the period from the organization of the new company December 1, 1939, to June 1, 1940.

Certain-teed Products Corporation—Net profit for six months ending June 30, 1942, was $458,609 as against $507,623 for the similar period in 1941.

Champion Paper and Fibre Company—Net profit for the fiscal year ending April 26 was $3,129,986 as against $2,379,660 for the previous year.

Crown Zellerbach Corporation—Net profit for the fiscal year ending April 30 was $9,108,801 as compared with $8,868,287 for the preceding year.

Crystal Tissue Company—Net income for six months ending June 30, 1942, was $50,454 as against $56,000 for the same period in 1941.

Dixie-Vortex Company—Net income for the twelve months ending June 30, 1942, was $828,902 as against $888,183 for the previous year.

Eastern Corporation—Net profit of $779,664 before provision for federal income taxes is reported for the first half year, as compared with $417,765 for the same period in 1941.

Gaylord Container Corporation—Net profit for the June quarter was $270,378 as against $273,133 in the March quarter and $394,201 for the June quarter in 1941. A 3½ per cent $6,000,000 debenture bond issue has been sold to the Equitable Life Assurance Society as part of the financing of the $8,000,000 expansion program of the past two years.

Great Northern Paper Company—Net profit for the half year was $848,214 as against $1,288,486 for the first half of 1941.

International Paper Company—Net profit for the six months ending June 30, 1942, after provision for taxes under existing law and reserve for possible additional taxes, was $4,639,982 as against $6,761,511 for the first half of 1941. Taxes for the six months' period increased from about $7,000,000 in 1941 to $16,000,000 in 1942.

Keyes Fibre Company—Net earnings for the six months ending June 30, 1942, were $167,022 as against $142,750 for the similar period in 1941.

Kimberly-Clark Corporation—Net profit for the June quarter, 1942, was $334,912 as against nearly double that figure in the same quarter of 1941. For the year ending June 30, the net profit was equivalent to $4.11 per share as against $3.25 for the fiscal year ending June 30, 1941.

Lily-Tulip Cup Corporation—Net profit for the fiscal year ending June 30 was $754,802 as against $607,220 for the preceding fiscal year.

National Container Corporation—Net profit for the six months ending June 30, 1942, was $418,060 as against $455,549 for the same period in 1941.

Oxford Paper Company—Earnings for six months ending June 30, 1942, were $368,391 as against $474,922 for the same period in 1941.

Paraffine Companies, Inc.—Net profit for the fiscal year ended June 30, 1942, after provision for depreciation, all taxes and other charges, and after providing a reserve of $500,000 for possible losses arising out of contingencies not now definitely ascertainable, amounted to $1,816,730 compared with $1,600,038 in the previous fiscal year.

Puget Sound Pulp & Timber Company—Net profit for the first half year was $437,532 as against $498,208 for the same period in 1941.

Scott Paper Company—Net profits for the six months ending July 4, 1942, were $837,890 as against $869,965 for the same period in 1941.

Sutherland Paper Company—Net

Washington

ROLLBACKS IN PRICE CEILINGS NOT EXPECTED

Indications are that there will not be any further rollbacks in price ceilings on any grades of paper without the affected branch of the paper industry being given an opportunity to be heard. This change of attitude is indicated by the authorization of industry advisory committees to the Office of Price Administration. The feeling in industry that the OPA had adopted a policy of basing prices on business conditions rather than the original program of checking spiral price increases resulted in various conferences. It became apparent after the rollback of kraft paper prices that any further action of that kind might result in violent protests from industry. Several advisory committees have been named, including kraft paper, kraft grocers, and variety bag manufacturers, and other groups may decide to seek the authorization of such committees.

▶▶▶ THE OFFICE of Defense Transportation has issued orders requiring maximum loading of freight cars, and studies of the effect on the paper industry are already under way in the Pulp and Paper Branch of the War Production Board.

▶▶▶ THE RUBBER SHORTAGE has resulted in orders limiting the amount of rubber to be used in rubber covered rolls such as those used by the paper industry. The production of rubber aprons for paper machines has been forbidden, and a search is under way for a suitable substitute material.

▶▶▶ INSTEAD OF PAPER AND paperboard being listed as materials of which there is a shortage, they are now listed by the WPB as materials that are available in large amounts. This is a definite change of attitude from that existing early in the year when speculative buying and overproduction was brought about by statements that paper would be in greater demand during 1942 than the mills could meet.

▶▶▶ JOSEPH I. LUBIN, named as chairman of a committee to work out a moratorium on questionnaires from government agencies to industry, has announced that radical curtailment of such questionnaires is being effected. As he stated the case, effective steps have been taken to eliminate "bootleg" data requests. This will be a boon to paper mill officials who have been burdened with demands for operating statistics, often duplicated by different government branches.

PAPER · · · America's 6th Industry

PAPER KEEPS THE RECORD

(NEWS ITEM: *The U. S. Army estimates that it took 1,000 tons of paper for the first draft registration.*)

Registration . . . classification . . . induction . . .

The administration of the National Selective Service Law calls for paper in unprecedented quantities—multiple forms, permanent records, directives, notices, follow-ups. Enormous quantities of bond, mimeograph, typewriter and carbon papers are needed for such uses, in addition to the paperboard boxes in which this paper must be shipped and stored.

Millions of file holders are needed for the permanent records of the great new Army. Fifty million file folders were ordered for one fort, alone.

To meet the enormous responsibilities of the war effort for production and more production, every mill in the Paper Industry has the whole-hearted cooperation of Puseyjones engineers. We want to make sure that you are getting the most out of your present machinery, as well as taking advantage of every opportunity to improve or replace worn-out or obsolete equipment.

The improved Puseyjones Winder for high-speed paper machines is designed to speed up the winding operation, increase roll diameters and maintain continuous and uniform production at the highest manufacturing speeds.

Operation is simplified by the latest mechanical improvements, including an individual motor drive for the rider roll and for each drum and a time-saving shaft replacement device. Slitters operated by individual motor drive have a pneumatic throw-off device for easy adjustment. The unloading of finished rolls is accomplished with an improved push-out device and roll dumping table, both motor-operated.

Keeping paper production at the point of highest efficiency is not only essential to Victory, but also best for the tremendous competition coming after the present emergency is over.

All orders subject to priority conditions of War Production Board.

THE PUSEY AND JONES CORPORATION

Established 1848. Builders of Paper-Making Machinery

Wilmington, Delaware, U.S.A.

THE SIGN OF TRADE MARK SUPERIOR QUALITY

profit for the first six months was $349,054 as against $426,707 in the first half of 1941.

Tomahawk Kraft Paper Company—Net income for the year to May 31 was $269,518 as against $269,929 for the previous fiscal year, although net sales increased $750,000.

Union Bag & Paper Corporation—Net income for the fiscal year ending June 30 was $2,452,069 as compared with $1,921,002 for the previous year.

U. S. Envelope Company—Net profit for the six months ending June 30, 1942, was $322,013 as against $248,788 in the same period of 1941.

S. D. Warren Company—Net income for the half year ending June 30, 1942, was $279,702 as against $248,220 for the same period in 1941.

New York Stock Exchange—Stocks

	Closing Prices August 25	July 25
A. P. W. Paper Co.	*1¼–1⅜	1⅜
Celotex	6½	6¾
Same Preferred	70	69
Certain-teed	1⅞	1⅞
Same Preferred	26	25⅞
Champion P. & F. Co.	*15½–16½	14¾
Same Preferred	*94–96	98
Container Corp.	12	12½
Cont. Diamond	*6½–6¾	6¾
Crown Zellerbach	11¼	10¾
Same Preferred	*82⅜–85	81¾
Dixie Vortex	*8⅜–9⅜	8¾
Same "A"	*36–36½	34½
Robert Gair	1⅜	1⅜
Same Preferred	*9⅛–9¼	9½
Gaylord Container	9¾	9⅞
Same Preferred	*49–50	50
International Paper	8⅞	9¾
Same Preferred	47⅜	49¼
Kimberly-Clark	*25¾–27½	24½
MacAndrews & Forbes	*17–18	16⅜
Masonite	25¾	27
Mead Corp.	6¾	6½
Same Preferred	*65–66½	*72–74
Paraffine Cos.	*28½–30½	28
Same Preferred	*90–100	95
Rayonier	*9⅞–9⅛	9¼
Same Preferred	26½	24⅜
Scott Paper	34	32¾
Same 4½% Pfd.	*110½–112	114
Same 4% Pfd.	108½	108
Sutherland Paper	*21–22	21¾
Union Bag & Paper	8⅜	8¼
U. S. Gypsum	51¼	51½
Same Preferred	171	169¼

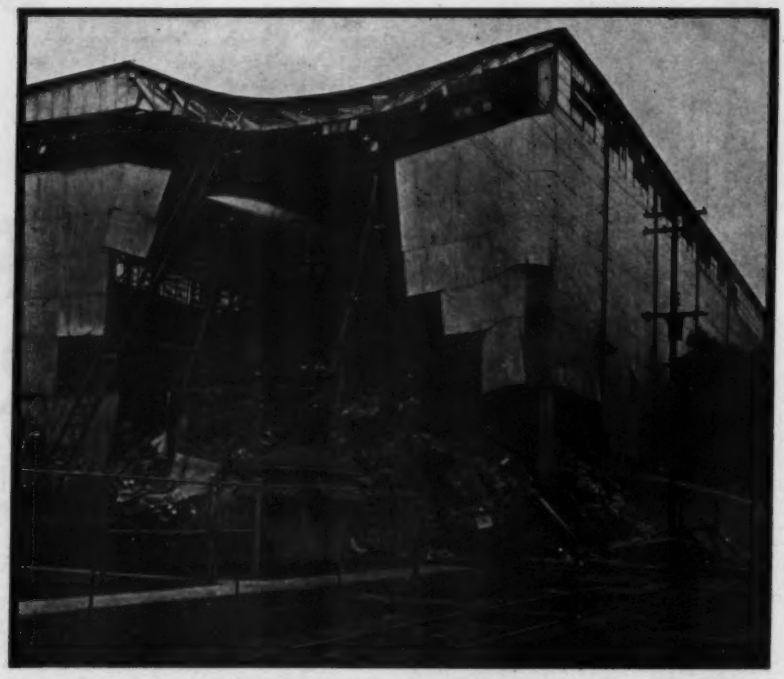
New York Stock Exchange—Bonds

Abitibi 5%		50¼
Celotex 4½%	98¼	98¾
Certain-teed 5½%	89⅜	90¼
Champion P. & F. Co. 4¾%		103
International Paper 5%	103⅞	104
Same 6%	104¾	104¼

New York Curb Exchange—Stocks

Am. Boxboard		3¾
Great Northern		27¼
Hummel-Ross	3⅛	3
St. Regis	1¼	1⅜
Taggart		2⅞
United Wall Paper	1⅜	1¼

*Closing Bid and Asked Prices.



During serious fire at the Sutherland Paper Company warehouse, wall collapsed under strain of water-logged paper bales.

SUTHERLAND LOSES STOCK IN FIRE—ONE FATALITY

A fire believed to have started by spontaneous combustion in a warehouse of the Sutherland Paper Company, Kalamazoo, Michigan, on August 12 caused damage estimated at more than $80,000 and cost the life of one employee.

The fire broke out about 4:00 o'clock in the afternoon and continued throughout the night—even through a test "blackout" from 10:00 to 10:30 p.m. Shortly after midnight a section of the wall of the all-steel wastepaper warehouse caved in, and nearly 250 tons of alum stored near this point of the building were lost. By early morning the fire was under control, but it continued to smolder for several days. Thousands of bales of wastepaper were totally destroyed and the building badly damaged. The warehouse is located on North Pitcher Street, directly opposite Sutherland's main office and Standard Division.

CRYSTAL TISSUE HONORS EMPLOYEES FOR FIRST AID

In recognition of their study in first aid work, The Crystal Tissue Company, Middletown, Ohio, entertained 31 mill and office employees at a dinner given at the Manchester Hotel on August 5. E. E. Grant, president, was in charge of the meeting.

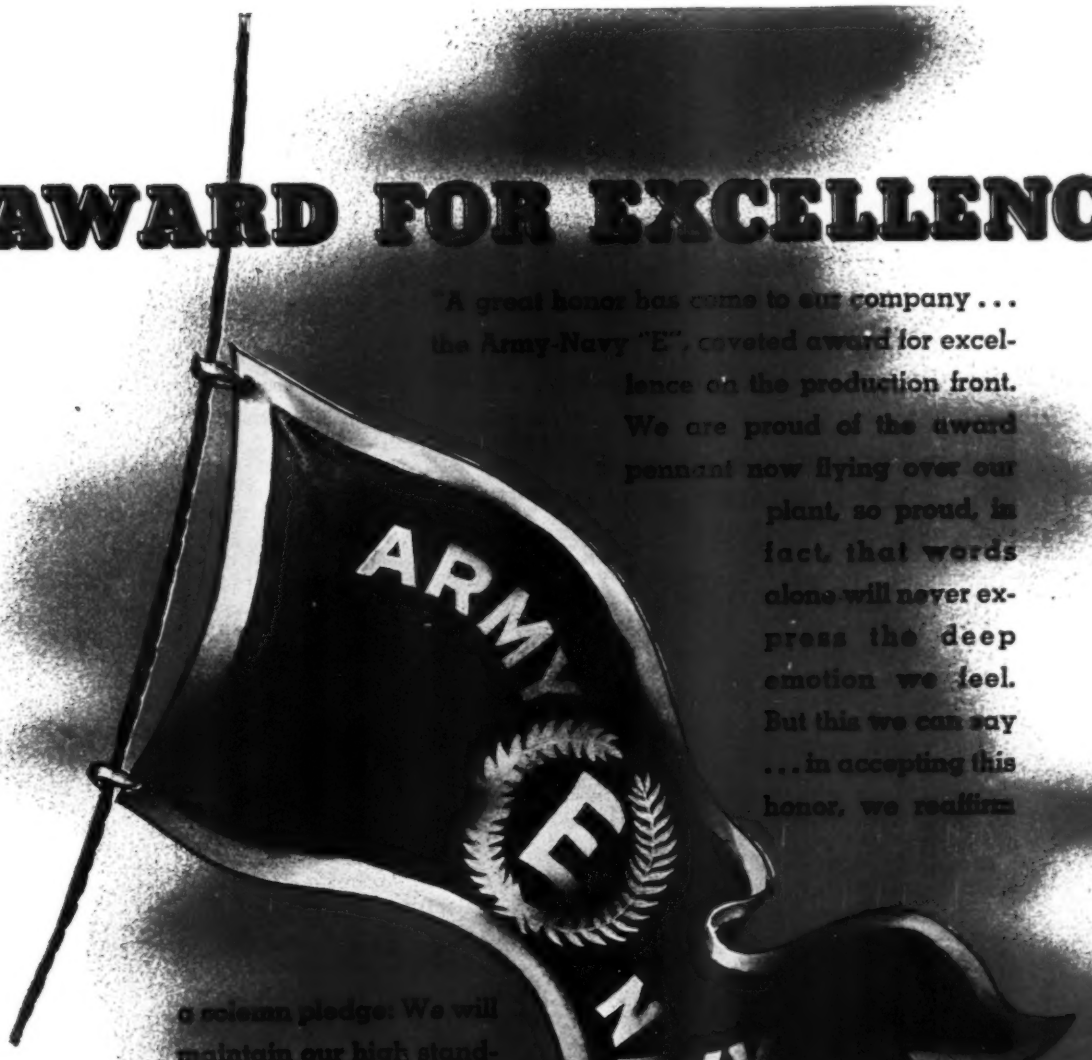
At the present time, 35 employees have received diplomas (among them Miss Elizabeth Cahill, secretary and treasurer of the company), and another class has more than half completed the course.

Following the dinner, L. J. Long, executive vice president, spoke emphasizing the dual importance of the training—emergency first aid in time of war and plant protection in time of peace. He also praised the work of the teachers who included John Burdsall of the Laboratory, Lowell Newman of the power department, E. Hiner of the electrical department, and Mrs. J. Blashock, wife of one of the company's machine tenders. H. H. Harrison, vice president in charge of manufacturing, also received recognition for his achievement as head of first aid training in Middletown and for other activities in civilian defense.

◆

▸▸▸ ERECTION OF ADDITIONAL ACCOMMODATONS for workers at the Woodfibre, British Columbia, plant of the British Columbia Pulp and Paper Company will be undertaken in the immediate future. Federal approval has been secured of the plan to construct two large bunkhouses at an approximate cost of $30,000.

AWARD FOR EXCELLENCE



"A great honor has come to our company . . . the Army-Navy "E", coveted award for excellence on the production front. We are proud of the award pennant now flying over our plant, so proud, in fact, that words alone will never express the deep emotion we feel. But this we can say . . . in accepting this honor, we reaffirm a solemn pledge: We will maintain our high standards of production. We will work untiringly to increase that production. We will never pause until the day when victory shall enable us to serve you once again in a world of glorious peace."

Chas. L. Bauer

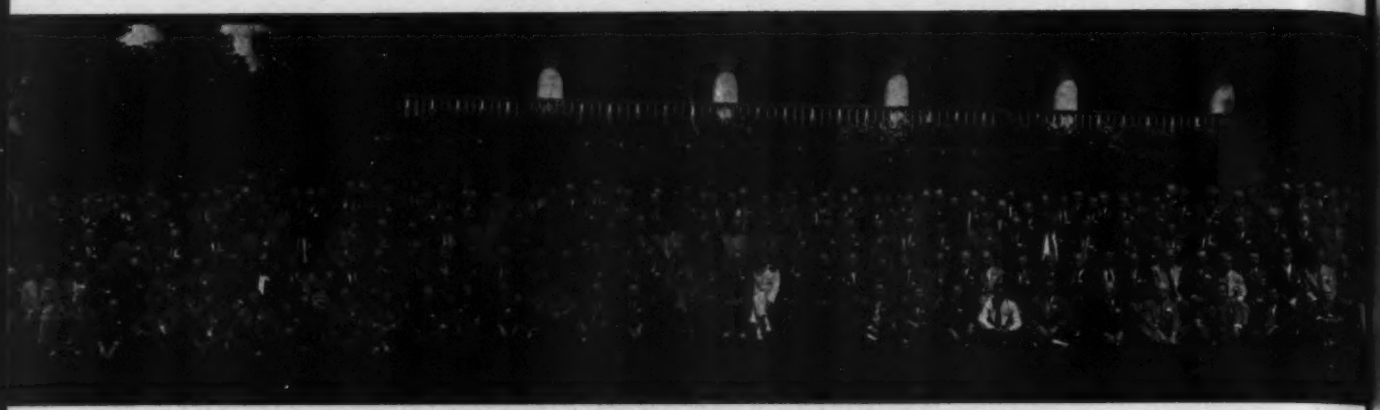
PRESIDENT

THE BAUER BROS. CO.

SPRINGFIELD, OHIO

BAUER PAPER MILL MACHINERY

Pulpers, Classifiers, Grinders, Separators, Laboratory Service



The Thirty-first Annual Conference of Hammermill Paper Company Agents was one of the most inspiring gatherings ever held by this group.

WARTIME-SERVICE HEAD TOPICS AT HAMMERMILL CONFERENCE

▶▶▶ The annual conference of the Hammermill Paper Company's agents has become an inspirational gathering. However, the Thirty-first Annual Conference of Agents held in Erie, Pennsylvania, August 27-28 will be recorded in the company's history as an outstanding meeting. Highlighting the discussions, of course, were topics centered upon how the company and its agents can contribute most effectively to winning the War and what service paper and printing can render that will be the greatest help. But the most stirring point of the conference was when the company's president, Norman W. Wilson, announced that the Hammermill Paper Company had been awarded the Army-Navy "E" Pennant. President Wilson further stated that this is the first time the award has been made to any concern in the paper field or any associated line, and that Hammermill is only the forty-ninth concern in the entire nation to be so honored with the joint award.

General business sessions at the conference were held at the Kahkwa Club with President Wilson presiding both days. Following Mr. Wilson's opening message to the agents, talks were given by Bruce Barton, nationally known advertising executive and writer; Donald S. Leslie, Hammermill's first vice president and assistant general manager; and Harrison R. Baldwin, vice president in charge of sales.

Mr. Wilson emphasized that shoulder to shoulder with the war duties of Hammermill and its agents is a mutual obligation to keep production and selling units alive. The War, he pointed out, will not be won without going concerns and employed individuals to support it.

Donald S. Leslie reported to the agents on the shape of things at Hammermill so far in this War, giving a brief summary of the direct war work being done at the mill, physical condition of mill and equipment and the contribution of Hammermill's personnel to the armed forces.

Harrison R. Baldwin reviewed the sales progress in the past year, pointing out with charts the sales trends of particular lines. At the conclusion of the first day's business meeting, Mr. Baldwin presented certificates of sales achievement to twenty-one different Hammermill merchants, climaxing his presentations with Grand Championship Awards to the three merchants whose sales were outstanding for all Hammermill lines.

The business session of the second day was devoted chiefly to discussion of the possible contributions of paper and printing to winning the War. A. Ellis Frampton, Hammermill's advertising manager and assistant general sales manager, demonstrated how Hammermill's advertising is pointing out the service of paper to wartime management and promised the continuation of the kind of advertising that has been a part of Hammermill's merchandising for more than thirty years.

New this year in the history of the conference was the establishment of a permanent Agents' Paper Committee comprised of nine representatives of Hammermill agencies.

J. Fred Wuenschel, Hammermill district sales manager for the Pacific Coast, reported briefly at the Friday meeting on war work and production at the Grays Harbor Pulp & Paper Company at Hoquiam, Washington.

The Agents' Advisory Committee met at Weigelia Lodge, the country home of Norman Wilson, on Wednesday evening preceding the first day.

COMMITTEE WILL PICK WAR WORKERS FOR WPB AWARDS

The appointment of a Technical Committee for Individual Awards has recently been announced by War Production Drive Headquarters. The committee, composed of distinguished engineers and technicians, will select the first list of workers in war plants to be honored by the Government for contributing valuable suggestions for increasing production.

The members of the committee are: Dr. J. L. Bray, head of the School of Chemical and Metallurgical Engineering, Purdue University, Lafayette, Indiana; Whiting Williams, author, lecturer, and consultant in industrial relations; Paul H. Stanley, chief engineer, Pitcairn Auto Gyro Company, Willow Grove, Pennsylvania; Charles B. Francis, chemical engineer and consultant, Carnegie-Illinois Steel Corporation, Pittsburgh, Pennsylvania; Henry C. Atkins, Jr., superintendent, E. C. Atkins Company, Indianapolis, Indiana; Dr. Joseph Rockoff, chief chemist, Dayton Rubber Manufacturing Company, Dayton, Ohio; William Plumer Hill, assistant superintendent, Bethlehem Steel Corporation, Sparrows Point, Maryland.

GREETING CARD INDUSTRY HOLDS XMAS CARD PREVUE

The Greeting Card Industry, New York City, has been carrying on a very colorful program to promote the use of cards for all occasions. However, since Christmas cards are now in season for the large buyers, a prevue of this year's cards was arranged by this industry.

A unique program was launched at the Waldorf-Astoria Hotel in New York City on July 30, and again at the Drake Hotel in Chicago, August 21, when a Christmas party, with a

Waterproof Research Leather Belting Offers Double Life for Paper Industry Drives

"Double life?"

"Sure. Excessive stretch is removed in manufacturing, so Research maintains uniform machine speed long after any other belt would have started wasting power. Besides, it saves takeup time."

"How about our pivoted motor base drives?"

"The same. Research takes continued flexing over small pulleys without the internal wear that shortens other belts' life. *Fifty Reports on Mechanical Power Transmission from Motor Drive to Industry* prove a first-quality leather belt like Research outlasts rubber V-belts 2 to 1."

"Looks like we can produce more paper at less cost per ton if we standardize on Research!"

Research Leather Belting
driving Jordan from pivoted motor base

Worcester, Massachusetts

tree, mistletoe, snow and candles was arranged for a large number of guests who enjoyed the traditional Christmas dinner consisting of turkey and all the trimmings. Following the dinner, a special delivery messenger arrived with a huge reproduction of the first Christmas card which was published in England 100 years ago. The original card is now in the British Museum in London.

Following the dinner, the guests were privileged to examine the exhibit of 1942 Christmas cards. Many of these have a wartime accent.

◆

HOBERG MARKS ITS 50TH ANNIVERSARY

The 50th anniversary of Hoberg Paper Mills, Green Bay, Wisconsin, was celebrated with an employee-family picnic attended by 1,500 men, women, and children. The highlight of the program was the presentation of War Bonds by J. M. Conway, president and general manager, to 48 employees who have served the company from 25 to 50 years.

Founded in 1892, Hoberg was the first paper mill in Green Bay and one of the first in the Middle West. Today it is self-contained, controlling the entire processing of products from the pulpwood tree to the finished article ready to be sold to the consumer, hence the Hoberg slogan "From Evergreen to Evergreen."

SIDNEY ROOFING INSTALLS THIRD CYLINDER MACHINE

A third cylinder machine has been placed in operation at the main plant of the Sidney Roofing and Paper Company, Ltd., Victoria, British Columbia, to increase its production of roofing felts, building papers, and boxboard.

The press, dryer, calender, and winder sections were purchased from a mill in Eastern Canada, dismantled, shipped in ten carloads, and rebuilt in the plant. The new machine is housed in a new concrete and brick structure of two-floor construction. The lower floor contains all the drive equipment of the cylinder machine, stock chests, jordans, pumps, and various auxiliary services. A new transformer vault for incoming 4,000-volt service is also on this floor.

◆

NO. 2 MILL OF KALAMAZOO PAPER DOWN FOR DURATION

George T. Judd, president of the Kalamazoo Paper Company, Kalamazoo, Michigan, announced on August 21 the complete shut-down of the company's No. 2 mill. Lack of business and a shortage of labor forced the closing of the mill and the shut-down of its two book-paper machines. One of the machines had been shut down about six months ago, and the other early in August.

The company now is operating two divisions, each with two machines, and two coating mills, and according to Mr. Jubb, most of the mill employees were absorbed in other divisions which are operating on a five-day week.

◆

TREE SEEDLINGS DISTRIBUTED BY MASONITE CORP.

For the sixth consecutive year, the Masonite Corporation, Laurel, Mississippi, has completed its free distribution of pine tree seedlings to farmers and growers in Mississippi, bringing the grand total to more than 7,000,000, according to R. G. Wallace, vice president and general manager. This company gave away more than 1,500,000 seedlings this year. Also, 122 planting demonstrations, witnessed by 2,549 persons, were held in 13 counties at 122 different schools.

This tree-planting program was launched by Masonite in 1936 and emphasizes the vital need for planting barren areas, selective cutting, systematic replacement planting, and fire protection. In addition to co-operating closely with governmental agencies, particularly the Mississippi Forestry Extension Service, it contributes substantially to the education of 4-H club members, Future Farmers of America, and individual farmers.

◆

MAKE RECIPROCAL TRADE AGREEMENT WITH URUGUAY

Reciprocal Trade Agreement with Uruguay has been concluded, under which concessions are made by Uruguay on imports into that country of various types of American papers and paper products according to a report issued by Warren B. Bullock, Manager of the Import Committee of the American Paper Industry. All of the new rates are a reduction of 30 per cent from the Uruguayan rates previously in effect, and are as follows:

Vulcanized Fiber—52 per cent ad valorem.

Cardboard of fiber or wood for construction — 5.20 pesos (nominally worth $.965) per 100 gross kilos.

Roofing paper coated with asphaltic composition—5.20 pesos per 100 gross kilos.

Cardboard and paper impregnated with other materials—5.20 pesos per 100 gross kilos.

The annual employee-family picnic of Hoberg Paper Mills, Green Bay, Wis., was a special celebration this year for it marked the company's golden anniversary. From a ringside seat the photographer took this view of the platform. J. M. Conway, president of Hoberg is speaking into the mike, and—yes, you're right—the distinguished guests at his right are Bud Abbott and Lou Costello, screen and radio funmakers. The comedians were in Green Bay at the time on their nation-wide War Bond tour. They appeared at the Hoberg anniversary celebration as guests of Mr. Conway, who is executive chairman of the Brown County War Savings staff of the U. S. Treasury Department.

DIAMOND SERVICE COUNSEL

IS HELPING MANY INDUSTRIAL EXECUTIVES TO ATTAIN THE MAXIMUM EFFECTIVENESS FROM THEIR ALKALIES TODAY!

THIS SAME SERVICE IS AVAILABLE TO YOU, TOO!

One of your most pressing obligations today is to get the most out of every ounce of raw materials. And Diamond is at your shoulder to help you fulfill that obligation. Call upon our experienced staff to help you "Conserve America's Resources"!

DIAMOND ALKALI COMPANY

PITTSBURGH, PA., *and Everywhere*

ALKALI

Hygienic paper in rolls not exceeding 15 cm. in width—7.80 pesos per 100 gross kilos.

Hygienic paper in sheets not larger than 20 cm. to a side—7.80 pesos per 100 gross. kilos.

Hygienic paper in sheets not larger than 46 cm. to a side—18.20 pesos per 100 legal kilos.

Hygienic paper in other forms up to 20 cm. to a side—7.80 pesos per 100 gross kilos.

Among the concessions to Uruguay made by the United States is a rate of 2¾ cents per pound on casein or lactarene, for which the Tariff Act of 1930 provided a duty rate of 5½ cents per pound. This fifty per cent reduction was made in the trade agreement with Argentina, and automatically applied to imports from Uruguay before the specific concession in the new Uruguayan agreement.

◆

WASTE DISPOSAL PLANT FOR WIS. DELAYED BY WPB

In an effort to conserve critical materials, the War Production Board has asked the Sulphite Pulp Manufacturers' Committee on Waste Disposal of Wisconsin to withhold its proposed construction of a pilot scale plant for the disposal of waste liquor from sulphite pulp for the duration of the War. The liquor has been blamed for the pollution of some rivers in the state.

A promising process for reducing the pollutional strength of sulphite liquor has been developed in the past two years, and government permission was sought to construct an experimental plant at Appleton. However, J. M. Conway, committee chairman and head of the Hoberg Paper Mills, Green Bay, stated that a number of other processes are being investigated and that the research program will be carried on consistent with the interests of national defense.

◆

MANDOS ORGANIZED TO PROTECT M & O

To furnish adequate protection to the paper and insulite plants and other properties of Minnesota and Ontario Paper Company at International Falls, Minnesota, and its subsidiary Canadian mill located across the Rainy River at Fort Frances, Ontario, the Mando Plant Guard Force was organized late in 1941.

Deputized by the local police authorities, members are armed with service revolvers or with riot guns, depending upon the nature of their duties. They are all carefully trained in patrol and watchman duties, emergency fire fighting and first aid.

In full co-operation with the War Department and the FBI, a complete and effective system of employee identification is enforced by the guard at all American Mando properties, and the presence of strangers is quickly and effectively controlled. All vehicles, parcels, and other deliveries are carefully inspected before entrance.

◆

TECH. STUDENTS SOON TO GET AID FROM GOVERNMENT

The loan fund of $5,000,000 voted by Congress to help college students speed up their training for technical and professional jobs will be available soon according to an announcement by Paul V. McNutt, War Manpower Commission Chairman. This financial assistance will permit students to pursuue intensive programs of study which will prepare them as soon as possible to meet the growing need for technicians. Loans will be made to students in engineering, physics, chemistry, medicine (including veterinary), dentistry, and pharmacy who are within two years of completing their work.

The loans will be made directly to students by colleges or universities, and by public or college-connected agencies. Totalling not more than $500 a year, at 2½ per cent annually, they will be cancelled if the student is drafted during training.

TEXTBOOK SALES KEEP UP WELL DURING WARTIME

The Joint Textbook Committee of the Paper Industry, New York City, reports that interest in the textbooks upon the *Manufacture of Pulp and Paper* is keeping up well in wartime. During the first half of 1942, sales came to 511 volumes, bringing the grand total to 35,459, since the publication of Volume I in February, 1921.

The Committee which sponsors these textbooks has been functioning for 24 years. The royalties from sales accrue to the Committee, and the funds thus derived are devoted to the necessary time-to-time revisions of the texts and the promotion of education in the industry.

◆

RANGER SCHOOL TO REPEAT WAR TRAINING SCHOOL

In response to a large number of requests, the war-training course given at the New York State Ranger School, Wanakena, New York, in plane and topographic surveying and topographic map drafting will be repeated. This second course will start September 28 and will run for 12 weeks. It is part of the Federal Defense Training Program to train high school graduates, proficient in geometry and algebra and physically fit, for surveying and topographic map drafting. This training is preliminary to defense work before the individual is selected for service in the armed forces.

The Minnesota and Ontario Paper Company maintains this fine protective squad known as The Mando Plant Guard Force. The Mandos protect the paper and Insulite plants of the M and O Company and its Canadian subsidiary.

4 things to do to get them quicker

use standard, open, sleeve-bearing motors whenever possible

The standard Tri-Clad motor, though classed as an "open" motor, is so well protected that it gives good service on many jobs where special motors often were recommended.

Sleeve-bearing motors often can be supplied more readily than ball-bearing types because of the present demand for ball bearings on other war equipment. Use ball-bearing motors only where load or mounting conditions require them.

Special end shields and other modifications may result in delay for you and others.

Consider the use of standard or multispeed a-c motors in place of d-c motors wherever this alternative is possible.

order motors early . . . giving complete specifications

Place motor orders when you order the machines they are to drive.

If you are planning motor drives for conveyors or other equipment for new plants, place the orders as soon as design work indicates the motor requirements.

Avoid delay and mix-ups by giving complete specifications, preferably on an order form which your G-E motor representative can supply.

give complete priority information, properly endorsed

The filling of many motor orders is delayed because of incomplete priority information. If in doubt about details, call the nearest G-E office.

When placing orders for motors, be sure that complete priority data accompanies *each order* in the form of certificates, properly signed, endorsements, etc. The priority is not effective in scheduling shipment until it is received by your supplier.

Your needs and the war effort are best served by using the proper priority rating assigned by the War Production Board for the job involved, and requesting delivery no earlier than actually required.

Under the Production Requirements Plan, builders of motor-equipped machines for subsequent sale may order their requirements in advance.

check with G.E. for delivery from local warehouse stocks

To meet urgent war needs, a supply of standard Tri-Clad motors is maintained at G-E factories and local G-E warehouses. Perhaps the motor you want, or can use with a few simple changes, is available for immediate shipment.

Your local G-E motor representative can furnish information on motors which may be in stock in the following cities:

Atlanta, Ga.
Boston, Mass.
Buffalo, N. Y.
Charleston, W. Va.
Chicago, Ill.
Cincinnati, Ohio
Cleveland, Ohio
Dallas, Texas
Davenport, Iowa
Denver, Colo.
Detroit, Mich.
Houston, Texas
Kansas City, Mo.
Los Angeles, Calif.
Milwaukee, Wis.
Minneapolis, Minn.
New York, N. Y.
Oklahoma City, Okla.
Omaha, Neb.
Philadelphia, Pa.
Pittsburgh, Pa.
Portland, Ore.
St. Louis, Mo.
Salt Lake City, Utah
San Francisco, Calif.
Seattle, Wash.

Tri-Clad motors are available in a full range of sizes from 1 to 100 hp. Your General Electric representative can supply complete information and help you get the Tri-Clad motor to do your job. *General Electric, Schenectady, N. Y.*

Your choice of G-E Tri-Clad motors will give you *extra protection* against (1) physical damage, (2) electrical breakdown, (3) operating wear.

General Electric and its employees are proud of the Navy award of Excellence made to its Erie Works for the manufacture of naval ordnance

SPECIFY *TRI CLAD* MOTORS

The PAPER INDUSTRY in NEWFOUNDLAND

▸▸▸ AFTER OPERATING FOR THREE YEARS under war conditions, the paper industry is just beginning to feel the pinch. The two paper companies operating in Newfoundland, the Anglo-Newfoundland-Development Company, and Bowater's Paper Mills, Limited, reduced operations in July of this year for the first time since the start of the war.

There are three reasons for the reduction in output: First, newsprint shipments to England have been reduced to a trickle because of the shipping shortage (both companies have lost two ships each through enemy action); second, the price ceilings set in the United States, which has always been Newfoundland's chief newsprint market, have made it next to impossible for the mills to operate at a profit; third, the shortage of manpower has reduced wood-piles.

The Anglo company's supply of wood is practically all floated to the mill but the cut this year has been reduced because of the lack of manpower. A large part of Bowater's wood is shipped by rail and ship to the mill, the amount floated to the plant being insufficient to keep the mill running. Rail shipments have been increased to make up the deficiency in ship transportation, but like all countries at war, war transportation gets priority on the railroads.

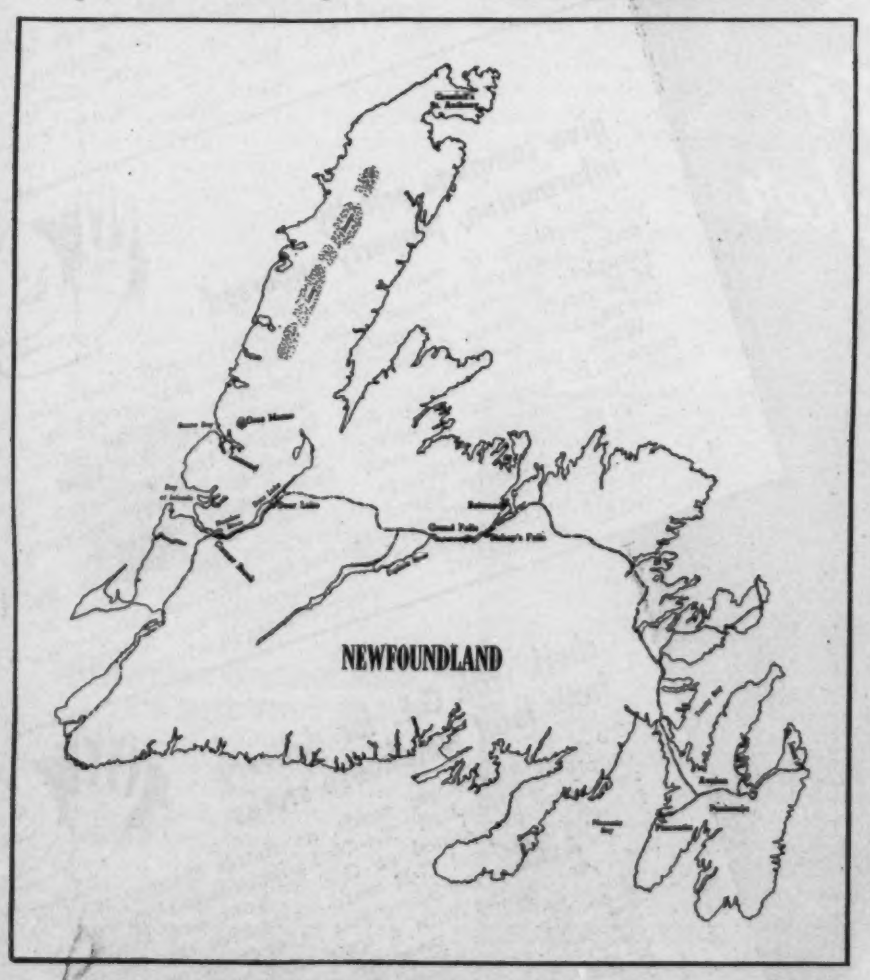
EDITOR'S NOTE: A contributor to this magazine just returned from a trip to Newfoundland. In this article he has written some of his observations while there.

The manpower situation is so critical at the Bowater mill that the office staffs are being drafted for wood handling, particularly the unloading of ships. Both men and women of the white collar personnel have signed up for emergency work on the wood docks; the first white collared stevedores unloaded a wood ship at the Bowater docks the last week in July. A further step to enlist office workers was made when the mill cut operations to five days per week; the clerical force has agreed to work in the woodcutting camps on its day off.

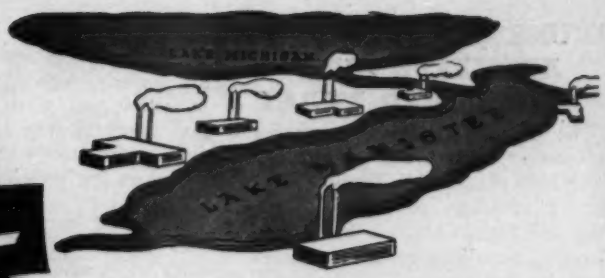
Both mills are having difficulty in getting replacement parts because of the lack of priorities. The Bowater mill was particularly hard hit when one of its own ships was sunk this summer with a full cargo of equipment. Both mills are making sulphite for war purposes and several machines have been taken off newsprint for this purpose; the sulphite manufacture permits certain equipment and supplies to be obtained on priorities.

To ease the transportation situation the paper mills have constructed miles of feeder motor roads and this program is being pushed as fast as conditions will permit. In some cases, the roads have been built to provide direct hauls to the mills, and other roads provide motor hauling to river banks. One of the most serious problems of wood supply is caused by the cessation of wood transportation during the five months of winter.

The general opinion in the industry in Newfoundland is that papermaking may cease entirely in 1943 unless relief for the various difficulties is found this year. Hope for the labor situation lies in the fact that many workers who are now engaged in the construction of air and naval bases will be released as these projects near completion in the months ahead. If the ceilings now fixed in the United States are adjusted so that Newfoundland paper can be marketed as in peace time, the mills will find an outlet for a normal output. It is hoped also that promised shipping will be available in 1943 so that transportation can be assured. It is believed that the question of the American market is the most immediate problem to be overcome.



The total area of Newfoundland is 42,750 square miles. There is only one railroad on the island (See broken line ——·——·——).



Every time the Wind Changes—

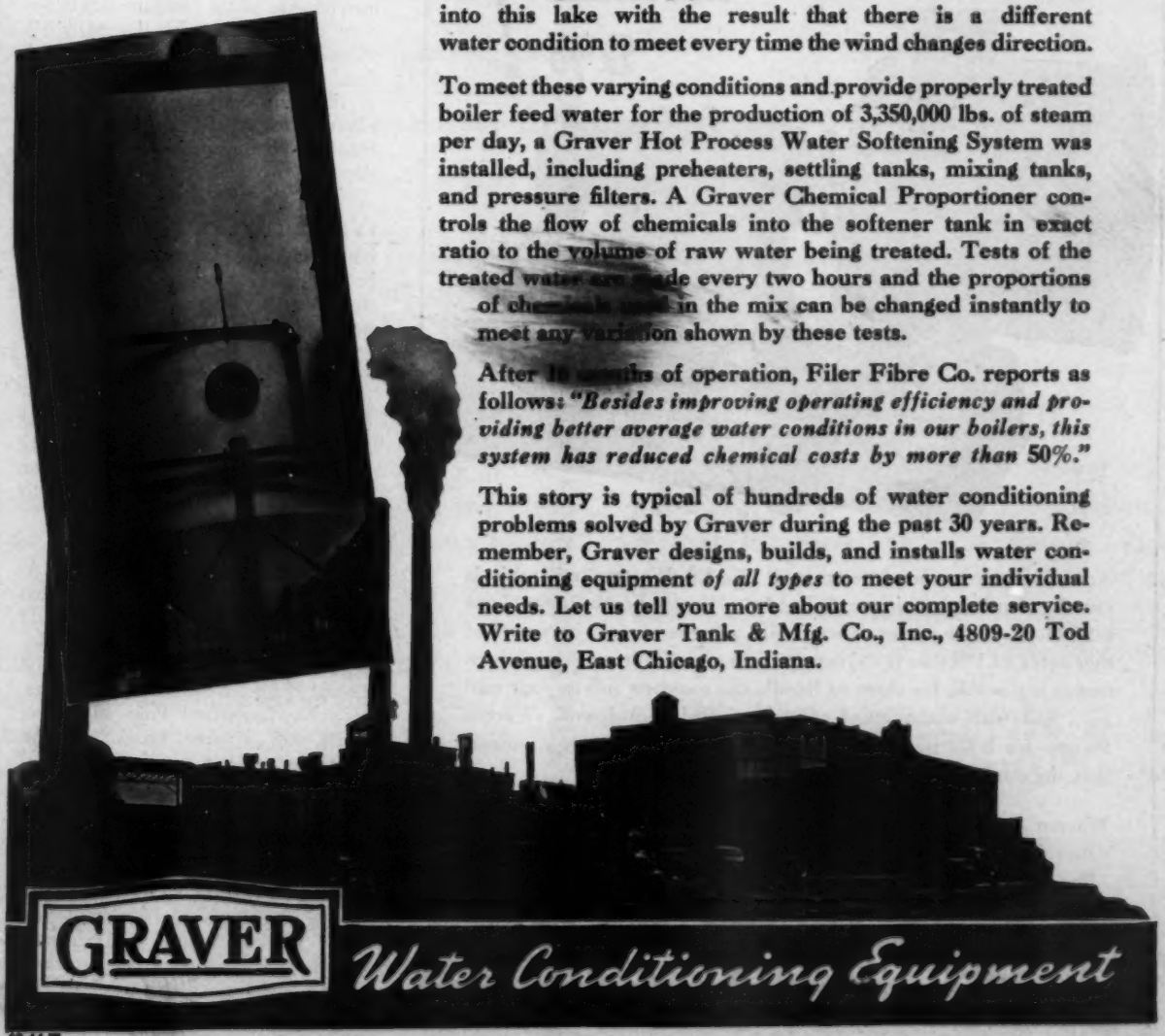
a different raw water to treat

The plant of the Filer Fibre Company at Filer City, Michigan, depends upon Lake Manistee for its raw water supply. Six industrial plants empty various kinds of industrial waste into this lake with the result that there is a different water condition to meet every time the wind changes direction.

To meet these varying conditions and provide properly treated boiler feed water for the production of 3,350,000 lbs. of steam per day, a Graver Hot Process Water Softening System was installed, including preheaters, settling tanks, mixing tanks, and pressure filters. A Graver Chemical Proportioner controls the flow of chemicals into the softener tank in exact ratio to the volume of raw water being treated. Tests of the treated water are made every two hours and the proportions of chemicals used in the mix can be changed instantly to meet any variation shown by these tests.

After 10 months of operation, Filer Fibre Co. reports as follows: *"Besides improving operating efficiency and providing better average water conditions in our boilers, this system has reduced chemical costs by more than* 50%."

This story is typical of hundreds of water conditioning problems solved by Graver during the past 30 years. Remember, Graver designs, builds, and installs water conditioning equipment *of all types* to meet your individual needs. Let us tell you more about our complete service. Write to Graver Tank & Mfg. Co., Inc., 4809-20 Tod Avenue, East Chicago, Indiana.



GRAVER *Water Conditioning Equipment*

43-44-W

BRUNSWICK CO.'S AFFILIATE BUYS TIMBER TRACT

The Cabin Bluff hunting preserve in Camden County, Georgia, has recently been purchased by Timber Lands, Inc., a subsidiary of the Brunswick Pulp and Paper Company, Brunswick, Georgia, according to an announcement by the executor of the estate of Howard E. Coffin. No purchase price was given.

The tract consists of approximately 40,000 acres of highland and 20,000 acres of marsh, and was acquired about 15 years ago by the late Howard E. Coffin, who improved and developed the property. Although no definite information was given, it is believed that Timber Lands, Inc., will further develop the tract with particular emphasis on the growing of pulpwood.

◆

▶▶▶ FOLLOWING A PERIOD OF DRYNESS which left the forests of the Gaspé Peninsula in danger of fire, Honorable Pierre Emile Côté, Quebec Minister of Lands and Forests and of Games and Fisheries, prohibited all traveling in that area.

SOLD FOR HANDLING 6% SULPHITE STOCK . . . HANDLES 9% !

According to repeated tests at a Middle Western mill this is exactly what is being accomplished by a Warren Stock Pump, Type 8-SOD-17. Such performance, while not guaranteed, is typical of that extra PLUS that is *engineered* into every Warren Pump which makes it possible for them to handle the toughest job in your mill . . . and with a minimum of upkeep and shut-downs. Warren Pumps are built to meet specific requirements . . . requirements that do not differ, basically at least, from *yours*.

Warren Stock Pump Bulletins go into further details and are yours for the asking; also Warren Engineering Service is at your disposal.

WARREN STEAM PUMP COMPANY, INC.
WARREN, MASSACHUSETTS

STATIONERY STOCK DAMAGED BY FIRE

Lightning was blamed for a fire which destroyed a warehouse of the Kalamazoo Stationery Company in Kalamazoo, Michigan, on August 7, and which for a time threatened to spread to other buildings in one of the city's principal factory and manufacturing districts. Many rolls and flat packs of expensive paper stock stored in the warehouse were destroyed or damaged by water and smoke. Loss was estimated at more than $20,000.

The warehouse building formerly was occupied by the Acme Universal Products Company, and for five years has been leased by the Kalamazoo Stationery Company.

◆

▶▶▶ AFTER 49 YEARS as paper wholesalers, the Marshall Paper Company, Appleton, Wisconsin, has gone out of business. The business and merchandise of the company was taken over on August 7 by the Marshall Paper Corporation, a newly formed firm, which will continue to operate in the building until November 1, when Kimberly-Clark Corporation, Neenah, Wisconsin, will take over the structure for storage facilities.

◆

▶▶▶ PULPWOOD which had been bought by the German Government before the War and had been awaiting overseas shipment when seized in behalf of the Dominion Government is piled at St. John, New Brunswick, and nearly every port which had been used in sending the pulpwood to Germany. Because of hampering shipping operations, a large quantity of the wood which was piled at or near the wharves has been moved to other locations.

◆

▶▶▶ REDUCTION OF OPERATIONS to a three-day week basis has been put into effect in the pulp and paper mill of the Anglo-Newfoundland Development Company, Ltd., at Grand Falls, Newfoundland. Bowater's Newfoundland Pulp and Paper Mills, Ltd., Corner Brook, are now operating under a five-day week.

◆

▶▶▶ THIRTY-NINE FOREST FIRES in the 15 counties of Upper Michigan destroyed 49.29 acres during July, according to figures released by the Michigan conservation department. During August, with water in streams and lakes low, the fire hazard steadily increased, department officials reported.

More ways to make YOUR LEATHER BELTS LAST LONGER!

No. 2 in a series of [illegible] industry on conservation of power transmission materials. Reprints may be obtained free for your belt man.

Don't use a bar to pry an endless belt on to fixed pulleys; you'll damage the belt. Loosen motor mounting, install the belt, then tighten the drive to required tension.

* * *

Renew worn fasteners or laces before they cause breakage or tearing. Watch metal fasteners on paper or wood pulleys; they'll pound and damage the pulley surface.

* * *

Remove tension from belts before cementing. Use clamps and rods to hold tight until cement sets.

* * *

Avoid sticky belt dressings. Use a penetrating preservative that nourishes the fibers.

* * *

Make certain that pulleys are smooth and clean at all times; a lumpy surface may cause blisters . . . separate the plies.

* * *

Wherever possible, avoid use of idler pulleys. If necessary to continue idlers now in use, check idler pulley alignment. Worn idler bearings often cause belts to weave when running.

Watch for slippage, which means loss of production as well as unnecessary belt wear. Choose a type of belting having high coefficient of friction. Tachometer readings of driving and driven pulleys will check slippage.

* * *

If excess heat is generated, ascertain the cause. One preventive is to select a belting leather which withstands higher temperatures . . . . creates less frictional heat in operation.

* * *

When ordering a new belt, consult the manufacturer's horsepower charts. Remember that smaller H.P. motors have greater overload capacity than larger motors. Be sure sufficient safety factor is included. Also consider correction factors needed where arc of contact is less than 180°.

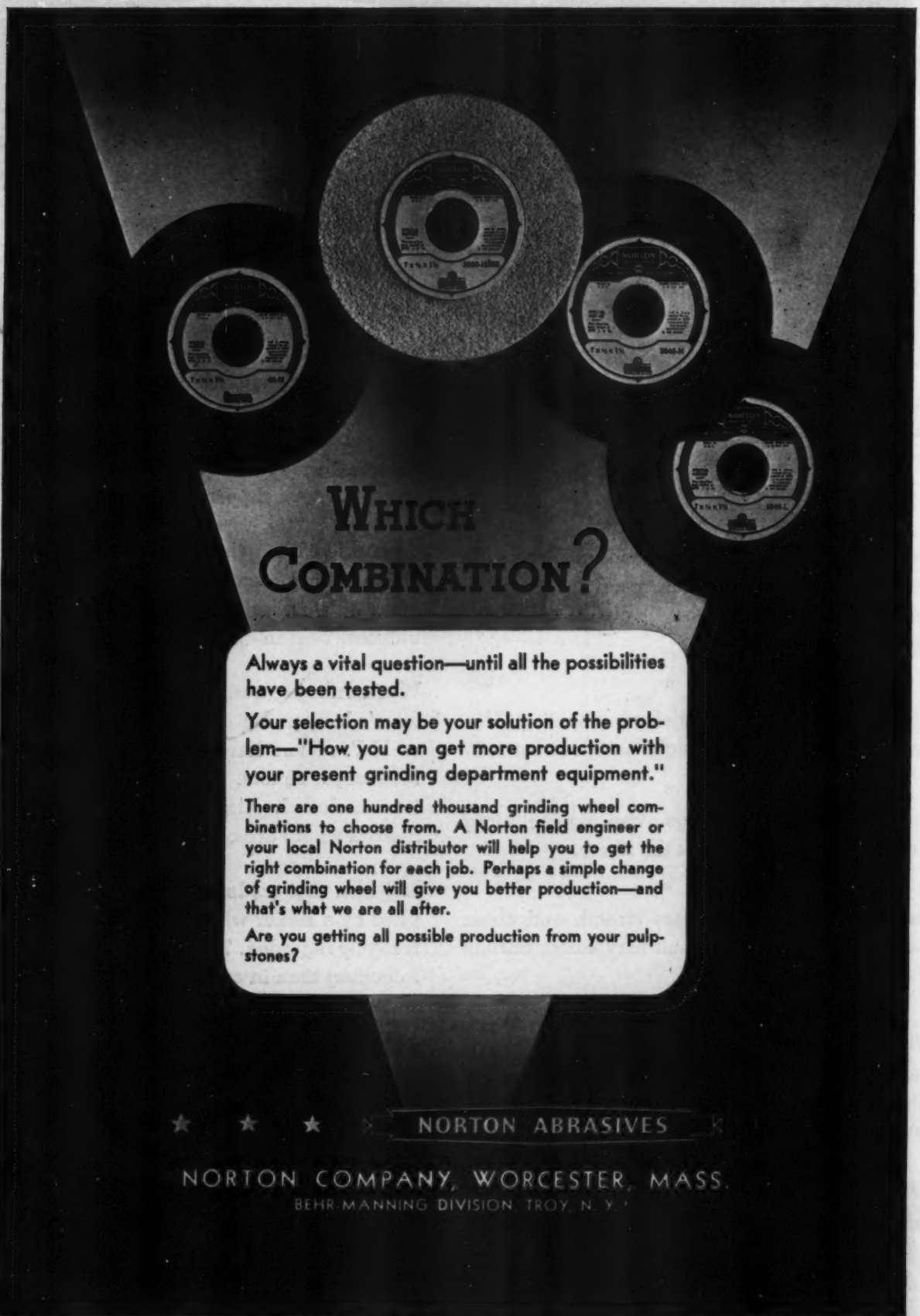
* * *

Insist on first-grade leather for new belts, supplied by a maker whose reputation and standing is highly regarded. There are no more "bargains" in belting than in any other materials. What you want is trouble-free, efficient production. Treaded Leather Belting merits your close investigation.

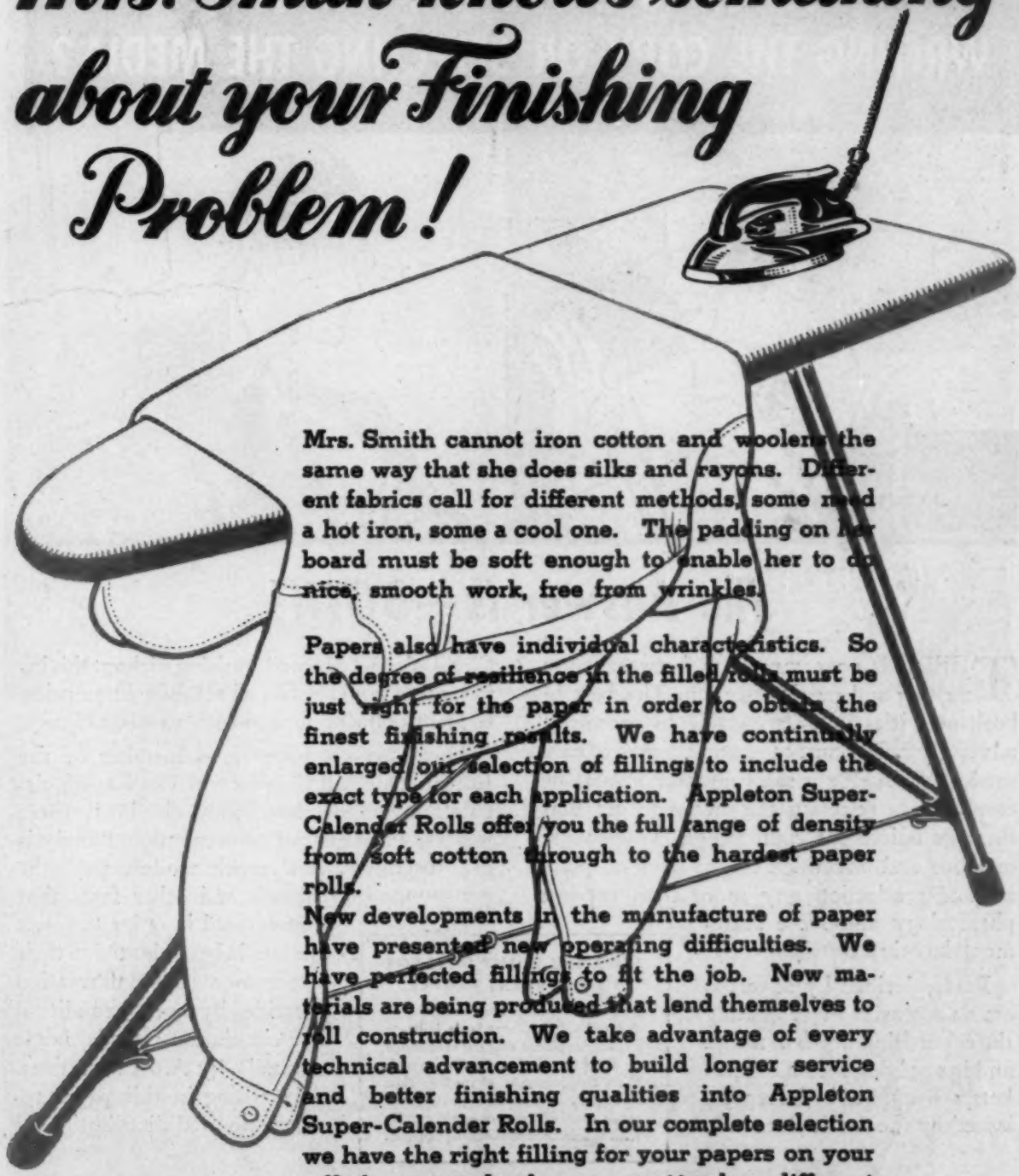
E. F. HOUGHTON & CO.

Chicago - PHILADELPHIA - Detroit

Houghton's TREADED LEATHER BELTING


WHICH COMBINATION?
Always a vital question—until all the possibilities have been tested.
Your selection may be your solution of the problem—"How you can get more production with your present grinding department equipment."
There are one hundred thousand grinding wheel combinations to choose from. A Norton field engineer or your local Norton distributor will help you to get the right combination for each job. Perhaps a simple change of grinding wheel will give you better production—and that's what we are all after.
Are you getting all possible production from your pulpstones?
★ ★ ★ NORTON ABRASIVES
NORTON COMPANY, WORCESTER, MASS.
BEHR-MANNING DIVISION, TROY, N. Y.

Mrs. Smith knows something about your Finishing Problem!



Mrs. Smith cannot iron cotton and woolens the same way that she does silks and rayons. Different fabrics call for different methods, some need a hot iron, some a cool one. The padding on her board must be soft enough to enable her to do nice, smooth work, free from wrinkles.

Papers also have individual characteristics. So the degree of resilience in the filled rolls must be just right for the paper in order to obtain the finest finishing results. We have continually enlarged our selection of fillings to include the exact type for each application. Appleton Super-Calender Rolls offer you the full range of density from soft cotton through to the hardest paper rolls.

New developments in the manufacture of paper have presented new operating difficulties. We have perfected fillings to fit the job. New materials are being produced that lend themselves to roll construction. We take advantage of every technical advancement to build longer service and better finishing qualities into Appleton Super-Calender Rolls. In our complete selection we have the right filling for your papers on your rolls for your calenders—no matter how different or how difficult your finishing problem may be.

THE APPLETON MACHINE COMPANY

APPLETON · WISCONSIN

WHICH IS MORE IMPORTANT—
WRITING THE COPY OR SELECTING THE MEDIA?

The Answer is—BOTH!

THERE is no competition between copy writing and media selection. The best in both activities is indispensable to successful advertising. Obviously the same degree of care used in producing a sales message should be employed in selecting the means to get that message before the right people. Guesswork, opinions and unverified claims have no place in media selection any more than careless phraseology and loose statements have in advertising copy.

Facts, decided by advertisers as essential in evaluating the advertising worth of media and in applying media to markets, are supplied in the reports issued by the Audit Bureau of Circulations. To buy advertising without this information would be like an attorney attempting to practice his profession without a law library.

This business paper is a member of the Bureau. Our A.B.C. reports tell how much circulation we have, how it was obtained, where it goes, an industrial or occupational analysis of subscribers, how much readers pay, the percentage of renewals and other facts that buyers need in order to select the media best adapted to their requirements. This information is verified by thorough audits of our circulation records, made annually by A.B.C. auditors. Advertising in this paper receives audited distribution.

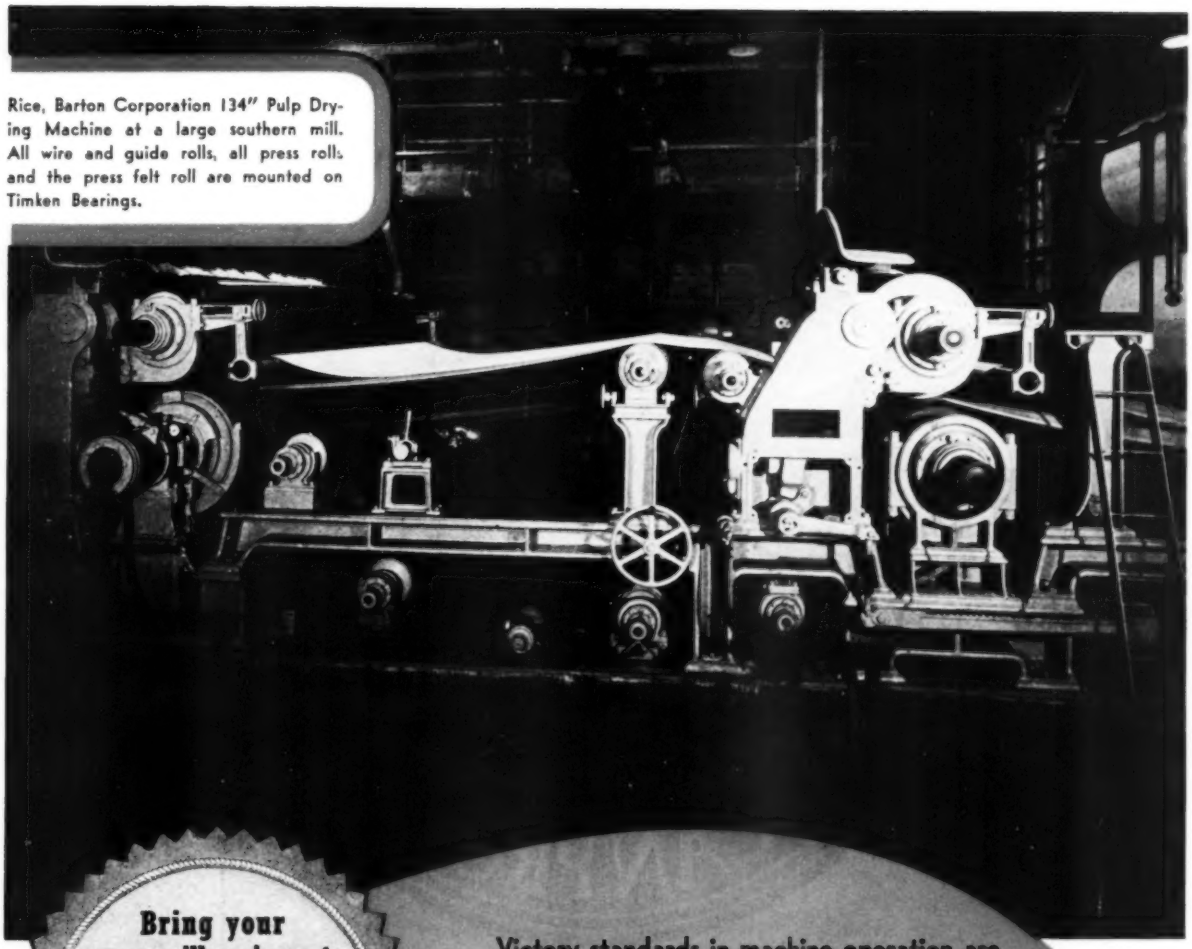
SEND THE RIGHT MESSAGE TO THE RIGHT PEOPLE

Paid subscriptions and renewals, as defined by A.B.C. standards, indicate a reader audience that has responded to a publication's editorial appeal. With the interests of readers thus identified, it becomes possible to reach specialized groups effectively with specialized advertising appeals.

THE PAPER INDUSTRY AND PAPER WORLD

Member of the Audit Bureau of Circulations ABC *Ask for a copy of our latest A. B. C. report*

A. B. C. = AUDIT BUREAU OF CIRCULATIONS = FACTS AS A MEASURE OF CIRCULATION VALUES



Rice, Barton Corporation 134" Pulp Drying Machine at a large southern mill. All wire and guide rolls, all press rolls and the press felt roll are mounted on Timken Bearings.

Bring your paper mill equipment up to Victory standards and assure post-victory economies. Redesign to increase the use of Timken Bearings.

Victory standards in machine operation are faster, more productive standards; performance free from involuntary interruptions and delays.

The more Timken Tapered Roller Bearings there are in your equipment, the closer it will come to meeting the programs of war and peace.

A few Timken Bearings are better than none in any machine, but if you want the utmost these bearings can give — in efficiency, economy and endurance — you must have them at every point of friction and hard service throughout your machines.

This is important to remember, whether you are a machine designer, manufacturer or user.

TIMKEN

TRADE-MARK REG. U. S. PAT. OFF.

TAPERED ROLLER BEARINGS

Manufacturers of Timken Tapered Roller Bearings for automobiles, motor trucks, railroad cars and locomotives and all kinds of industrial machinery; Timken Alloy Steels and Carbon and Alloy Seamless Tubing; and Timken Rock Bits.

THE TIMKEN ROLLER BEARING COMPANY, CANTON, OHIO

TO ASSURE VICTORY
BUY UNITED STATES WAR SAVINGS BONDS & STAMPS

CONVERTS CORN STARCH INTO THE MOST ECONOMICAL TUB OR CALENDAR SIZING A PAPER MILL CAN USE

★

R. T. VANDERBILT CO., INC.

230 Park Avenue, New York City

Editorial

The Power of an Idea

▶▶▶ ON SEPTEMBER 15, 1941, the then chief of the Pulp and Paper Section of the OPM made a speech before the National Paper Trade Association at their annual fall meeting in Chicago. In that graphic talk, he made the forecast that twenty-six million tons of paper would be required to fill this year's demand. That forecast was instantly publicized to the four corners of the country. It came to the producers, buyers, merchants, and consumers with startling concussions. The result was that every consumer of paper at once began to place orders for paper to cover immediate and prospective demands far ahead into this year.

Every statistician in the industry was non-plussed. Their figures showed that in 1940, the total consumptive demand was 16,600,000 tons, the greatest tonnage year on record. But, here came the chief of the Pulp and Paper Section of the OPM, a Government official, supposed to be "in the know" as to future Government demand for paper products, predicting an immediate vertical rise in that demand of some 9,000,000 tons, more than the existent capacity. That predicted increase was equivalent to the production of 140 new mills producing 200 tons a day for 320 days in the year.

The idea was electrically fantastic. Every authority in the industry knew it was unattainable, but to say "it can't be done" was to be classed as a defeatist. Things which had never been done before were being done now. And, furthermore, to win the war, the patriotic thing to do was to increase production, curtail consumption and save every scrap of paper for collection and return to the mills for conversion into increased tonnage.

Now, it is a well-known rule in successful advertising, that the general public is quick to grasp and execute a campaign based upon one idea. Hence, the slogan spread like wild fire throughout the country—"Save paper and help win the war." The people were psychologically ripe for the adoption of just such an idea in order to demonstrate their desire to do something to help win the war.

It was their first opportunity to show Washington that all they needed was "the working idea" and they (the people) would deliver the goods. Well, what followed is now history.

How every mill, every marginal, obsolete mill, and every conversion plant worked over time to increase paper production prodigiously.

How every boy scout, girl scout, the churches, the Salvation Army, and the women's auxiliaries, the janitors and junkmen of the entire nation hopped to the challenge, saved, collected and baled waste papers. They went to the job with a vengeance. It became a holy crusade—and why not?

Paper is the most universally used and most essential commodity known —needed in some form or other in every bank, office, factory, shop, store, hotel, house and home in the land. To save paper was to become a patriot. Paper was everywhere. Everyone became a patriot.

The sequel to this narrative of a dynamic idea is sad to relate. There is no paper shortage.—There never was a paper shortage. Instead, there was a huge overproduction of paper and so great was the collection of waste papers that the Government was forced to advise collectors to cease collecting. Tons and tons of collected waste paper were burned to relieve bulging warehouses which could take no more. The official campaign to conserve paper and help win the war backfired. Paper dealers and paper consumers today have unliquidated inventories of paper on hand.

Mills are ceasing operation for lack of orders. Men are losing their jobs in the mills. Closed mills have lost their labor for the duration. Costs of producing paper are advancing. The War Board has requisitioned the entire lumber cut of the country. The principal raw materials, like pulpwoods, are becoming unprocurable. Other critical materials are well nigh unpurchasable.

A semiparalysis has already becalmed paper mill activities. "Where do we go from here?" is the question every paper mill man asks today. The echo answers "where?"

It was a powerful idea—to hook paper-saving to patriotic enthusiasm. But every paper-saving patriot has now become a disillusioned cynic.

The winning of the war by saving paper has ended in failure to all concerned. However, the people have scotched the saving paper idea and salvaged from the debacle, the one and only idea that has dynamic power—"Win the War!" And woe betide the man or men who hinders their will to win. That is a power-packed fact.

Winter Preparedness

▶▶▶ MAINTENANCE in pulp and paper mills always has been an important responsibility. This responsibility is greater now than ever before. If the industry as a whole is going to do its full part in helping to win the War, it will be necessary for every mill to get the greatest productive life out of every piece of equipment it uses. This result can be obtained only through constant vigilance and action at the proper time.

A large percentage of the pulp and paper mills of this country are located in regions of cold winters. These mills always have had to prepare in advance for cold weather if they were to get through a winter with the least amount of operating annoyance.

It has been customary for the more far-sighted engineers, maintenance executives, and mill operators connected with such mills to foresee possible cold weather troubles and to take advance precautions to prevent their occurrence. In this way, mills have run much more smoothly, winter after winter, than would have been possible otherwise.

What has been good practice in the past is particularly good practice this year. With the beginning of cold weather only a few short weeks away, work scheduled should be gotten out of the way as quickly as possible.

Wherever a question arises as to potential trouble, correct the condition, if possible. Otherwise, plan now to meet the difficulty when it arises during the winter, so that the work can be done then with least delay and with greatest comfort to the employees who must do the job.

THE AMERICAN HOME IN 194? A. V. (After Victory)

▶▶▶ SINCE THE YEAR 1500 B. C. —a matter of some 3,500 years—there have been only 237 years in which there was not some sort of war being waged. For the most part there have always been wars, and so long as kids fight and dogs chew each other, there doubtless will be wars until this tiny globe upon which we live falls into the sun. But, however devastating and destructive wars may be, each one teaches the human race something constructive. Out of each terrible war comes something, or some things, which are of great benefit to mankind.

Out of the womb of that great mother, Necessity, this first global war is teaching us much about the places in which we live. Because of this war, the homes of tomorrow will have small resemblance to the awkward, inconvenient, and rococo affairs we formerly lived in. Some of the homes, for a single instance, now being built in so-called *defense* areas, are little more than a box, in which there are partitions 18 to 24 inches thick—but partitions which are not fixed to either floor or ceiling, but stand on *domes of silence* so that they may be moved or adjusted at will. In such homes, when company comes, one may re-arrange the furniture a trifle in order to slide the partitions back to make the dining room larger, the living room larger, or to erase the rumpus room almost entirely for that particular day or evening. That is but a single example of what we are learning about homes.

During past years, the one room that captured the popular imagination was the kitchen. Why? Because in this one room the joint effort of the equipment manufacturer, the designer and the builder succeeded, at least in part, in applying the possibilities of mass-production and establishing modern scientific standards of convenience, sanitation, and illumination without overstepping economic boundaries or running ahead of popular demand. And yet, the present day so-called streamlined kitchen is far from perfect. In some ways it is inferior to the craft product it replaced. Its essential scheme, continuous counter cabinets and counter-height equipment topped by continuous wall-hung cupboards, handicaps good natural lighting and puts much of the storage space in the stoop-or-stretch position. It ignores the need for good work surfaces at various heights, especially surfaces low enough to work at sitting down.

The shiniest, all-porcelain prewar refrigerator is still an overly-deep, too-low box better fitted for hide-and-seek than for storing the innumerable small items it must contain. More than this, it spills much of its valuable cold out of the bottom of the opening every time the door is opened. The counter-height range is definitely inferior to the high-oven model it superseded. The oven is awkwardly low, and the broiler frequently is but a few inches above the floor. And any sort of range is archaic in comparison with specialized cooking equipment such as pressure cookers, lunchroom "broilerators," electric chafing dishes, electric griddles, etc. Just stop a moment and compare the amount of human energy expended in boiling an egg on the top of a range and in boiling it in an automatic electric egg boiler.

The bottom of the sink is still six inches lower than experts assert it should be—just because no one has devised a way to harmonize a higher rim and drainboard with the surrounding cabinet work. Mechanical dishwashers are by no means so efficient as the restaurant sterilizers, while waste disposal is yet an unsolved problem. Lighting is none too good and the glaring hospital whiteness still creates a seeing problem in the place where good sight is a prime requisite.

In the After-Victory kitchen many of these problems will be solved. In them we will take advantage of the U or the L arrangement, while in them we will incorporate automatic laundry machines and much equipment for other work which can best and most conveniently be done in the kitchen. Doubtless there will be a demand from housewives for a television set to enable them to see and hear illustrated cooking lessons and soap-suds operas.

▶▶▶ Akin to the prewar kitchens, the bathroom has always been a place of pride or shame. Actually, this feeling was based on the fact that it could be kept reasonably clean (if you didn't look too closely into the corners) and had running water. Beyond this, the bath, as we know it, is little to boast about. Consider the morning routine of the typical home owner, Mr. Wagner:

Rubbing sleep out of his eyes, and walking rather woodenly, Wagner enters his peach-and-black sanctuary after getting up early so as to be out of the way by the time the children are aroused. He opens the valve labeled "hot" as quickly as possible, then jumps with the alacrity of a grasshopper to the far end of the tub because he knows from experience that it will take some seconds (seemingly minutes) to empty the shower pipes of cold water before the hot begins to flow. Follows a long period of delicate adjustment of shower valves (and profanity) to bring the resulting spray to the desired temperature. Wagner emerges from his bout with the shower valves to find the entire room saturated with moisture, the medicine cabinet mirror covered with mist, and his electric razor hidden behind the aspirin, iodine and mouth wash bottles. The light for his shaving comes, as usual, from behind his head or glares from tubular lamps alongside the mirror. In the meantime, Jimmy is scratching at the door and clamoring for his "turn."

Mrs. Wagner, too, has complaints about this citadel of sanitation. She would like more towel racks (Wagner is not a handy man around the house, and besides, as he has frequently pointed out, how can he fasten anything to the tile walls?). She would like twice as much space in the medicine cabinet (and from the looks of that assortment she needs it). She would like a 3-way mirror, a make-up counter for cosmetics, a place to keep the hair dryer, and plenty of towel storage space.

In the bathroom of the postwar period there will undoubtedly be far more porcelain enamel used. Porcelain enameled panels which may be cut at will and installed with invisible corner rosettes. This means walls and ceilings will be of easy-cleaning and sanitary porcelain enamel—readily adjustable for the installation of built-in fixtures, the removal and replacement of piping, etc.

Such are the problems to be solved, and such are the things to be seen, in the home of A. V.—*After Victory.*

LET US HELP YOU

"Keep the Wheels Turning"

ON THE PRODUCTION FRONT

CONVEYING—ELEVATING

There are many types of conveyors available today and it is most important that the correct type be used for each application. Link-Belt manufactures them all—belt, trolley screw, Bulk-Flo, chain, apron, flight, bucket, etc.—all products of over a half century of experience in the engineering and manufacturing of equipment of this kind. A nation-wide staff of engineers is at your service.

MECHANICAL POWER TRANSMISSION

The maintenance of your mechanical power transmission equipment, in A-1 running order, is all important to maximum production efficiency. Link-Belt transmission experts, with a complete line of mounted and unmounted ball and roller and babbitted bearing units, clutches, couplings, collars, sprockets, shafting, etc., are ready and anxious to assist you.

DRYING AND COOLING

If you wish to cut costs and improve your drying operations, eliminate obsolete methods, save on heat and maintenance, you will be interested in the unique features of the Roto-Louvre dryer-cooler as described in special catalog and engineering data book No. 1911. It contains valuable information on the subject of drying and cooling. Send for a copy.

SHOVEL-CRANE-DRAGLINE SERVICE

Link-Belt Speeder Corp. offers a complete service to those engaged in essential construction, excavation, erection and other work, calling for the use of this type of equipment. A complete line ranging from ⅜ to 3 yd. capacity and a country wide engineering and service personnel is available to serve you.

● With industry on the offensive, all goes well only as long as your material handling and preparation, mechanical transmission and power equipment are holding up . . . for the Nation's life depends on the productivity of this plant equipment.

Constant vigilance and an extra measure of lubrication, cleaning and adjustment will ward off breakdowns — conserve replacement parts —save priceless production time.

●

LINK-BELT COMPANY

Chicago Indianapolis Philadelphia
Atlanta Dallas San Francisco
Cedar Rapids Toronto

Offices, warehouses and distributors in principal cities

8885-A

POWER DRIVES

Slipping drives are a menace to machine efficiency. Link-Belt chain drives (silent, roller, steel, malleable, and other types) cannot slip . . . . engagement of chain and sprockets is positive . . . . no frictional contacts . . . . no lost R.P.M. . . . the rated capacity of the driven machine is maintained at all times. Let a Link-Belt positive drive specialist help solve your drive problems.

SPEED REDUCTION SPEED CONTROL

Top performance requires the exact type and size unit that will fit your application. Making three types of gear reduction units—herringbone, worm and motorized—and two types of variable speed units—the P.I.V. Gear and V.R.D. units—Link-Belt can and will give you authoritative and unbiased counsel. Send for helpful engineering data books.

SIZING—SEPARATING

Whether your problem is complex or simple, be sure and call on Link-Belt for help. Years of experience in the application and manufacture of a complete line of all types of screens—vibrating, shaking, rotary, conical, cylindrical, etc.—assure successful installations. Send for literature on any or all types.

COAL AND ASHES HANDLING

Getting coal to the fire and ashes away presents one of today's most fertile sources for conservation and increasing efficiency in power plant operation. A special Link-Belt Book, No. 1510, points the way with ideas and suggestions, and information on the proper application of the various types of mechanical handling equipment. Send for it today.

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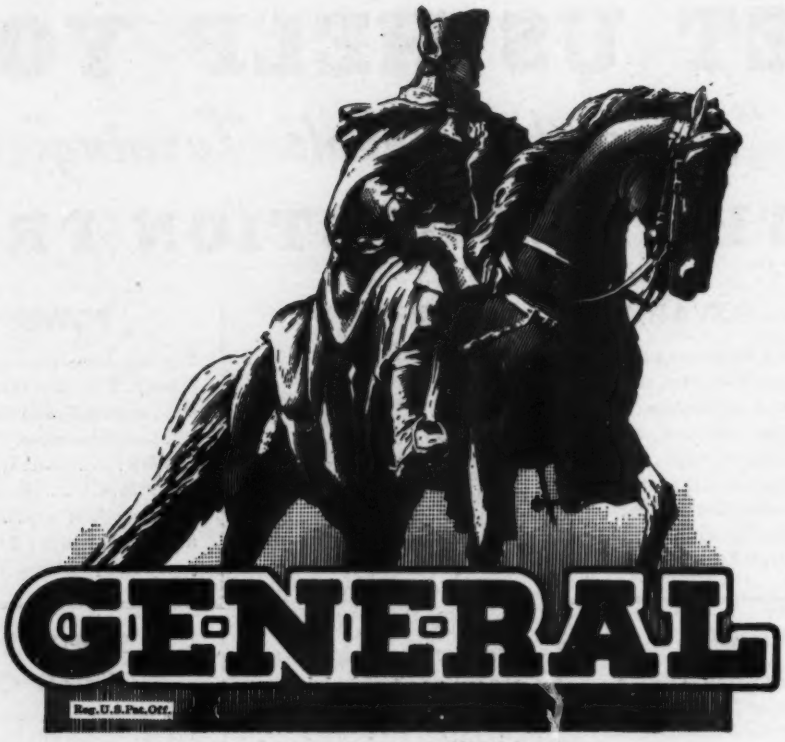

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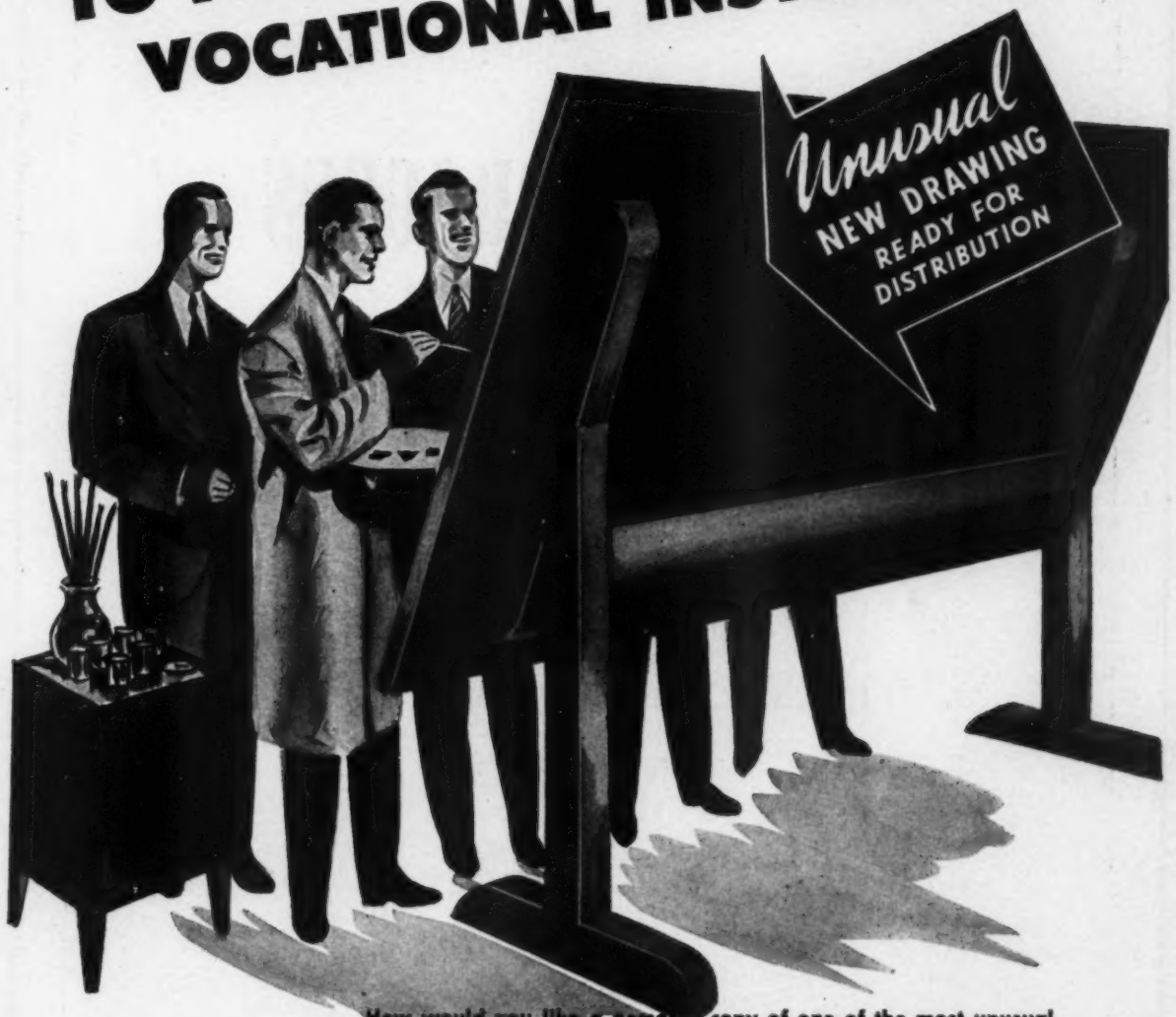
TO PAPER MILL VOCATIONAL INSTRUCTORS



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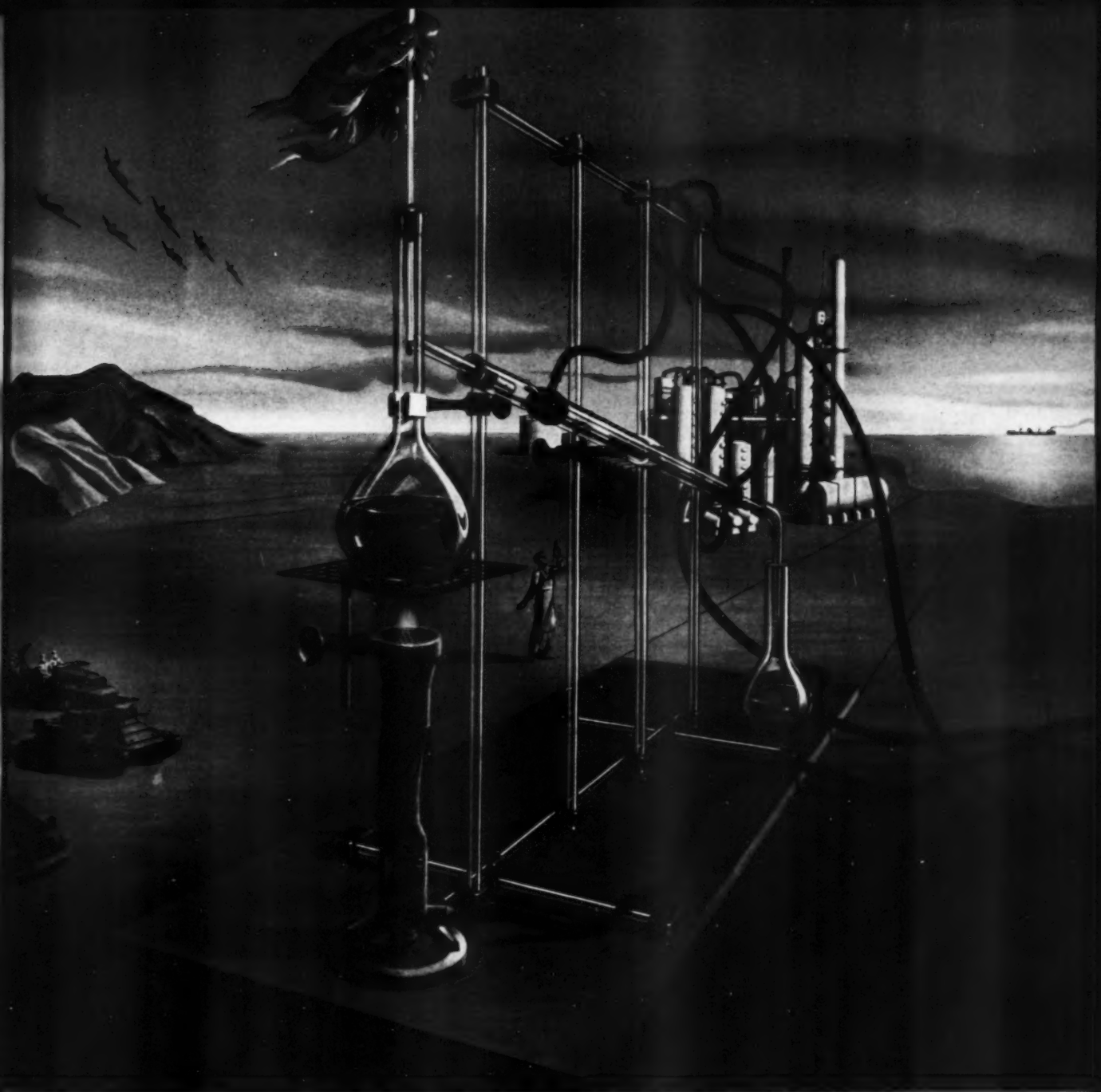

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Koppers serves the chemical industry in peace as well as war. Of the hundreds of coal tar intermediates, dyes and medicinals, about 87% are produced in greater or less degree from benzene, toluene, naphthalene, and phenol. Koppers is one of the principal sources of these and other basic materials. —Koppers Company, Pittsburgh, Pa.

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PHYSICAL PROPERTIES

Specific Gravity	1.37
Weight per Cu. In. Oz.	0.8
Modulus of Elasticity, psi	1,500,000
Tensile Strength with grain, psi	9,400
Tensile Strength across grain, psi	7,000
Compressive Strength, Flat, psi	37,500
Compressive Strength, Edge, psi	25,000
Bending Strength, psi	18,000
Water Absorption in 100 hrs.	1.07%
Scleroscope Hardness	75
Max. Operating Temp. Deg. F.	275
Thermal Coeff. Expansion	30 x 10^{-6}
Dry Coeff. of Friction	0.280
Permanent Set per 1" thickness under load of 1000 psi	.002

RYERTEX *non-Metallic* **BEARINGS**

Felts *and* Wire Performance

E. A. PATERSON, Machine Tender
Great Lakes Paper Co., Ltd.

▶▶▶ THE NECESSITY FOR ECONOMY in the use of important materials by non-war producers is well-recognized. Many such materials, particularly wool and copper, are indispensable in the manufacturing of paper of all grades, and are used by the industry in large quantities.

As a general practice, and for obvious reasons, papermakers are constantly seeking for means to improve drying efficiency. Keeping felts open is one way to maintain suitable drying conditions. An open felt will permit the web to dry easier and more evenly. It also results in better felt life.

A felt to be open must be shrunk properly, spread out, slack, straight, and clean. The method of shrinking a felt (so essential is this operation to machine operation) must be so well-known that it requires no further comment. Of the remaining four factors, spread out is the most important since it is influenced by, and, in turn, influences the other three.

One of two important changes made on the first press of the machine operated by the author, with a view of better felt performance, was the installation of an additional worm roll (making a total of three) to aid in keeping the felt spread out. Prior to making the change, it was necessary, during the week (because of felt marks) to wash and sometimes even to turn over the felt when still comparatively new. That practice has been discontinued entirely, the increased spreading effect of the additional worm roll serving to keep the felt clean. It also is assumed that with the more open felt, the suction of the felt conditioner and, to a lesser degree, of the suction press, is more effective than formerly.

The additional worm roll also permits the felt to be run slacker, a factor of paramount importance in getting the best possible life out of a felt. A slack felt, theoretically at least, is more open than a tight one; at the same time, its strands are subject to less strain which tends to pull them apart, therefore the increased life.

How long it has been since it was first recognized that a slack felt gave increased life is not known, but it is surely a long time. When a very young man around the machine room of another mill, the author remembers the commotion that was stirred up among the machine tenders because the superintendent padlocked each of the felt tighteners. Each day, this superintendent could be seen tightening the felts, apparently so many turns each; but later he discontinued the practice.

The author also recalls a machine tender of years ago who kept his felts fiddle-taut. His running mates did not follow that practice. In retrospect, it appears that the felts would have been much longer lived had they not been tightened so much by this one operator.

However, there are factors which determine how slack a felt may be run. Among these factors is the unsteadiness of the felt on the machine. A slack felt also has the tendency to bag at its thinnest or most worn spot and to buckle at the edges. Either bagging or buckling, if allowed to go beyond a certain point, would spoil the felt. This point is determined by the condition of the felt itself, the condition of the press rolls, and the amount of weight carried on the press.

Another obstacle to the running of a slack felt is the desire to maintain a straight seam; but the straight seam is not as important as running with a slack felt. Here again, the condition of the felt and, to some extent, the press rolls determine how readily a felt can be made to run with a straight seam.

A new felt may be run slack, maintaining a straight seam, with little or no danger of bagging or buckling. As its period of service increases, however, because of the factors already mentioned, a tighter felt is necessary.

Worm rolls commonly have been considered to be hard on felts. Therefore, after installing the additional worm roll on the first press part of the machine, one roll was removed from the section. During this period of operation, the machine crew was always getting in trouble with either a felt wrinkling or running off the machine. After a comparatively short period, the roll was replaced.

If worm rolls are hard on felts, they certainly have their off-setting advantages. For one thing, the additional worm roll has given greater machine operating efficiency, and, for another, it has permitted the felt to be run much slacker without danger of wrinkling or unsteadiness.

On one occasion, a hard drying condition, which taxed the ingenuity of the machine crew, showed up on the machine. Upon checking it was found that the sheet was half sticking to the second felt, something that it had never done before. All the characteristics of a sticking sheet were ab-

EDITOR'S NOTE: The author is a machine tender on a 304 in. newsprint machine running at 1200 fpm. The machine is equipped with bronze suction first and second presses, each having a top granite press roll, a suction couch over which is a soft rubber roll, and a fourdrinier save-all between the forming table and the return part of the wire. In this article, written to share knowledge gained in the mill with which he is associated with other units of the industry, he relates mill experiences, which in his opinion, have resulted in longer life of machine clothing.

sent, and an unusually slack felt was the only accountable reason for the condition.

The felt was tightened considerably. Then the sheet was made to follow its regular position. As a result, drying eased off 8 Fahr. to normal drying condition.

This experience prompted the superintendent to remark, "Keep the sheet off the felts for better drying conditions." Then paper rolls, which had been thought previously to be unnecessary, were installed immediately following the presses. As it is now, the sheet barely touches the felts except when passing through the presses and where the first press felt acts as a carrier between the couch and the first press. Naturally, this arrangement has prevented any further sticking of the web to the felts.

There is a felt conditioner on the outside of each felt to keep it clean. The individual conditioner is of simple construction, consisting of a suction box with maple cover slotted in a herringbone pattern with slots one-half inch wide and four inches long, and carrying eight to ten inches of vacuum (Hg). Because of its design, the felt conditioner also acts as a spreader.

It is the practice of washing the felts on week-end shutdowns with a hot soap solution and to turn the first press felt over. Otherwise nothing is done to them except when the first felt begins to mark or mottle.

A number of things have been tried to relieve that condition, such as wire and steel brushes, air hose, etc., but none of them have been as successful as a high pressure water hose, innovated recently by the superintendent. The hose, operating under a pressure of 350 lb. per sq. in., is attached to a special nozzle so shaped that the water jet fans out like a fish tail at an angle of approximately 20 degrees. This jet is applied against the outside of the felt at an angle of about 70 or 80 degrees so that the stream will be in the same direction as that of the felt. The nozzle is moved across the felt, three inches or so from it, with the jet being directed against a convenient roll. It is imperative to direct the water against a roll, otherwise, the high pressure may cause it to split, or, at best may damage the felt beyond repair.

If the nozzle is used while the machine is in operation, the water is directed against a roll ahead of the felt conditioner, and, to make water removal more effective, the other conditioner is choked off.

Possibly the advantage of this high-pressure water jet over brushes or air hose is that it removes pitch, saw dust, and fine stock imbedded in the felt, while the brushes or air hose do not. The effect of the jet, to some extent at least, slackens and widens the felt, just as in turning it over. Once a felt begins to mark, the jet is used once a day until such time as the felt is so threadbare that it is no longer effective and a new felt is put on.

Peripheral irregularities in press roll faces wear out felts in streaks, and can be removed only by grinding. On week ends it is a customary practice to polish the roll faces with a brick of a coarse grit. Roll pressure also has a deteriorating effect on felts, but this pressure is unavoidable if economy and evenness of drying are desired.

However, after a certain maximum pressure is reached, additional weight has no effect on drying and only increases the wear on the felts. Therefore, the practice should be to ease off weights to the minimum and still maintain an efficient drying condition.

Even then, irregularities of rolls must have some effect on felt wear. Such irregularities are apparent in the constant oscillation of levers, however slight. It is obvious that such movement of levers under their momentum, say downward, exerts additional and unnecessary pressure on the felts.

Loaders have replaced weights and part of the leverage on the machine to overcome this additional pressure and to absorb the lengthwise irregularities of the rolls. They are of the diaphragm type, compressed air being used to load them, and a push button for unloading.

Three advantages of the loaders observed through their operation are: flexibility in overcoming inertia caused by change of pressure due to irregularities of rolls, flexibility in absorbing shock of sheet if doubled over in a break prior to the second press, and ease in the unloading of the presses. Of these advantages, the unloading feature has been most evident, because of the need in the present setup to unload the second press when taking over the sheet. If the press is not unloaded, the narrow strip, no matter how carefully blown onto the felt, eventually causes light crushed spots in the felt.

Prior to installing the loaders, the lever and weights on the front side of the press were raised manually. The disadvantage of this arrangement was that one man could not take the sheet over the presses while the rest of the crew prepared the machine. Then, too, as likely as not, the sheet would be blown to the press anyway.

Since installing the loaders, the second felt has been remarkably free of such light crushed spots. Naturally, these spots wore holes in a felt within a comparatively short time. The unloading of the first press is not as important as that of the second because the sheet going to it is much softer.

After making a conservative allowance for conditions not identical to both periods under observation—(1) before installing the additional worm roll, the high pressure water jet and the loader, and (2) after making the installation—it may be stated the felt performance on one press has increased by more than 15 per cent, when based on the number of days run, or an additional 10 per cent, if based on tons of paper produced.

Under present operating conditions, better stock is furnished the machine than formerly. The average machine speed is higher. The trim is somewhat wider.

Felt performance is affected considerably by the quality of the stock. If the stock is slow and soft, more weights on the presses are required for good drying and operating performance. Likewise, if the sheet is slow and soft, it is more impressionable to felt defects, such as threadbareness, filled up, holes, and sewings. A soft sheet, therefore, requires more frequent changing of the felt than a hard sheet.

The stock condition also affects the trim. Occasionally, on an extra wide trim, even more additional weight is required if the sheet is soft.

No records are available of the weights carried on the presses before making the machine changes which have been mentioned. It is believed, however, that these weights were higher than the present ones.

Other former operating conditions not known include the condition of the presses and the condition of the suction boxes in the press shells. Whether the boxes were plugged up or partly so, or whether they were free from stock accumulation, would affect the amount of weight to be carried on the presses.

Sewed up holes, if in firm parts of a felt, can be made to run almost as long as the rest of the felt if the sewing is done carefully. The life of the repaired portion of the felt can be improved by placing a piece of enamel cloth over the slots of the conditioner in the line of travel of the

sewed area of the felt. If, for some reason, a weak spot appears in a felt (usually the second) it is almost imperative that the seam be left as it was. Straightening of the seam or tightening of the felt only tend to make that particular defect worse.

Pitch that gathers on the surface of the felt conditioners causes holes in the felts, especially in second press felts. Often the pitch sticks to a felt in lumps when the felt is being stopped. Should the lumps pass the nip of the press, holes will appear shortly afterward. Therefore, a felt is never stopped unless absolutely necessary. If it is, the top roll is raised, and the felt run slowly so as to remove the lumps that may have stuck to it before going into operation again.

It has been the usual practice (now discontinued) to buy extra wide felts and to trim them to the proper widths after shrinking them on the machine. Some wool could be saved if this trimming operation could be eliminated by having a felt of a width, which after shrinking, would not require it. Possibly, experiments with different types of weave, makes and grades of felts would reveal the proper width of felt.

If the individual felt life is unpredictable, individual wire life is more so. Though all factors affecting wire life may be known, some of them are not easily controlled in practice.

An experienced operator hardly would consider the installation of worm rolls on a fourdrinier part. The weight of rubber is more or less static. To change the tightness of a wire is to invite trouble to say nothing of its effect on quality.

Cracks on the edges of a wire is a condition that reduces wire life as well as operating efficiency of a machine. Three principal causes of such cracks involve the deckles, the rubber squeeze roll, and fresh water.

Previous to installing the deckles now in use, each deckle consisted of a straight board to which a rubber packing strip was bolted. To avoid the loss of stock and to obtain a good sheet edge required the deckle to be so tight on the wire that cracks resulted from the incident wear.

The deckles now in use consist of strips of cloth, enameled both sides. Used in place of the packing rubbers, the cloth is lapped on the inside approximately one-quarter inch to make unnecessary such vertical weight as was required for the rubbers. The only friction on the wire is the weight of the deckled cloths, the stock it carries most of its length, and whatever head pressure is exerted on the stock as it comes out of the slice—most of this pressure being dissipated against the inside surfaces of the deckles. Since incorporating this change on the deckles, wire wear has not been nearly so intensive.

Probably the surest way to get cracks at the edges is to set the rubber squeeze roll a little too hard on the wire. Once properly set, the squeeze roll should not give trouble for a considerably long period of time. However, if too much pressure is applied, cracks will result in a comparatively short time, even in a new wire.

Another cause of cracks, possibly a controversial one, is water. Two conditions must occur before it can be blamed for cracks: (1) wire edges must be bare of stock, and (2) fresh water must be applied to them. In the extreme, the stock which flows on the body of the wire is easily 40 Fahr. warmer than the fresh water.

Theoretically, using the coefficient of linear expansion of copper as the basis of calculation, there is a contraction on the wire edges of ⅜ of an inch for a 90 ft. wire that is brought about by the difference in temperature of the water carrying the stock and the fresh water used on the machine. This strain tends to pull the wire apart at the edges.

The correction of such a difficulty is simple. Either curtail the use of fresh water or pull out the deckles so that the wire edges are covered with stock.

Another cause of impaired wire life is pimples. They are caused by small chunks of hard foreign matter and dried out stock which find their way, usually inside, between the wire and the rolls. Eventually, they become holes in the wire.

Pimples are small bulges and cannot be removed. During week end shutdowns the wire is slackened off, and the fourdrinier rolls and save-all are cleaned thoroughly of any stock accumulation through the use of high pressure water from a hose. Stock, slime, and pitch that otherwise would be left to harden and eventually cause trouble with the wire are removed by this washing.

To prevent pimples from rust and other foreign matter in the shower water, an individual filter is installed in each shower line as close as possible to its respective shower.

Edge cracks on the front side of the wire have been reduced by changing the palm on the wire guide from bronze to stainless steel. Equally important, too, is the proper alignment of the palm. It must contact across its entire width; otherwise, unraveling of strands occurs and is a source of cracks.

By following the practices, which have been outlined, it is not unusual to remove a wire that has not only fully served its purpose but which also is holeless and has had very little trimmed off. Compared to prior practices, the present procedures show considerable improvements in wire life.

A prewar practice, now discontinued, was to cut off a wire at a week-end shutdown when it was thought that the wire would not last much more than two or three days. In line with the trend of making the most of strategic war materials, a wire is now made to run until it literally and sometimes actually falls off the machine.

In starting up a new wire, it is imperative to run it as slack as possible for a few revolutions at slow speed to center it on the machine. If this precaution is not taken, the wire is likely to wrinkle.

A cause of wrinkles peculiar to a wide machine is the springing of the return rolls when a wire is stopped. As this springing is incidental to a tight wire, the practice is to slack off the wire before a shutdown and to tighten it only upon resumption of operation.

Ridges in a wire may be rubbed out but it usually is unwise to rub out wrinkles, especially if they are short and sharp. Likewise, it is better to leave pimples in a wire alone and not attempt to rub them out.

While experimenting with various chemicals to eliminate slime trouble, the *p*H of the stock to the machine dropped from a range of 6.2-5.9 to around 5.0. The wires used during this testing period, usually of dark color, brightened up and gradually took on the shine of newly minted copper. Their performances were reduced greatly by this corrosion, thus indicating the need for establishing *p*H commensurate with wire life.

In the event of further restrictions of machine clothing (felts and wires), possibly some operating defects may be minimized by reducing machine speeds. Such practice would mean higher production costs and probably would result in paper of sub-standard quality; but such restrictions will be cheerfully put into practice if this procedure will aid in bringing the present conflict to an early and successful ending.

Mill Shutdowns Prevented

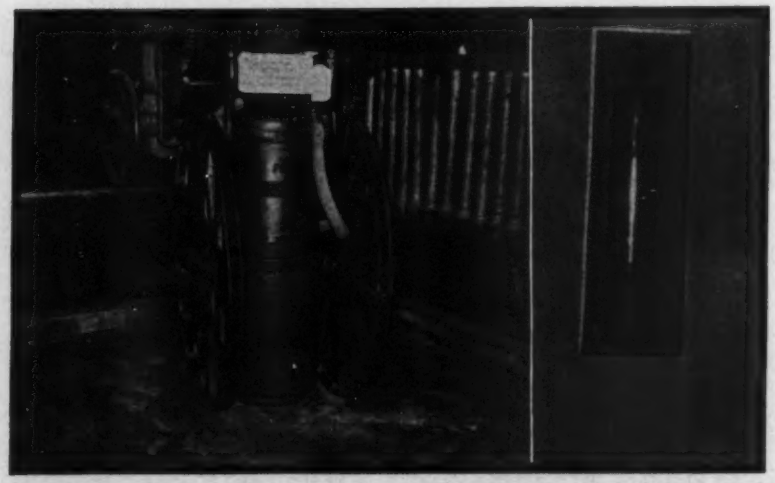
by Checking and Correcting

G. W. PHILLIPS
The Champion Paper and Fibre Co.

▸▸▸ A NUMBER OF YEARS AGO the management of The Champion Paper and Fibre Company realized the need for concerted effort to keep buildings and equipment in good condition, to minimize waste, to eliminate fire-hazards and to keep fire-fighting equipment in good working order. At that time, special responsibilities were delegated to certain employees with explicit instructions to follow up and report regularly to the plant manager and superintendents. Such a setup has been very helpful in the daily operation of Champion plants.

Inspection of Mill Buildings and Equipment

Buildings, roofs and operating equipment are inspected regularly by members of the maintenance department, and minor repairs are made as quickly as possible. A close watch on equipment and the making of minor repairs in time quite often will prevent breakdowns and loss of production. This endpoint, of course, calls for frequent and systematic inspection by both mechanics and operators. Operators must be taught that "care saves ware" and that "a stitch in time (quite often) saves nine,"—perhaps an expensive breakdown. The operator is in a position to detect a condition that might cause delay or breakdown. Therefore, he is made to feel, that the upkeep of his machine is as much his responsibility as it is the responsibility of the mechanic who inspects and repairs. Major items, the cost of which exceeds a certain amount, are referred to the plant manager or general manager for approval.



LEFT—Foam engine. Units of this kind are placed at strategic points throughout the plant. RIGHT—Hand-operated chemical fire fighter. This type of equipment is located conveniently throughout the plant. Several units are placed on machine room wall and alongside each paper machine.

Waste Prevention

The mill laboratory, under the supervision of a chemical engineer, is largely responsible for waste prevention. Technicians, especially trained for the work, are required to check hourly every source through which leaks might occur, and to report conditions to the various superintendents. A warning to the responsible party usually prevents any further preventable losses.

A pulp and paper mill has many avenues or outlets through which valuable stock or chemicals might escape unless a very close check is made. A laboratory controlled plant requires a force of technicians to check all outlets or sources of waste. Of course, automatic samplers are employed in some plants; but hand sampling at frequent intervals by a trained technician is better. This procedure is expensive; but a technician can note at once any irregular condition and follow it to the source. Correct sampling is necessary to get an accurate picture of losses; an incorrect sample can completely discount any program. Automatic samplers often provide materials for an imaginative alibi.

In a pulp or paper mill, large quantities of material in solution or water suspension are handled. Since liquids don't pile up, any leak or spill frequently finds an outlet through the nearest drain. Often it is observed that watchmen are stationed at strategic points to prevent pilfering, while the waste ditches flow unattended and unpoliced, carrying valuable loads out to a stream where they cannot be recovered.

A clear stream of water from a cooler or condenser looks exactly like a solution of salt carrying one pound per gallon. Worthless brown waste from a rinsing washer looks exactly like the heavier liquors headed for the reclaiming departments. The laboratory trained technician can and does evaluate such losses by tests and often locates their origin.

When one considers that approximately 50,000 gallons of water are required for every ton of wood pulp made, and perhaps 10,000 or 12,000 gallons per ton of fine papers, it is evident that all streams of waste should be policed and carefully checked at frequent intervals. Every drainage ditch should be equipped with a metering device so that the quantity of discharge can be ascertained. Likewise, a regular collection of samples should be maintained. Sometimes the best method is to follow upstream to the source and observe where and how various losses are occurring. Persistent effort and personal checking are the requisites in such a routine.

In the paper mill, the start should be made with the main sewer outlets, thence back upstream to discharges

from various equipment, floor drains, save-alls, etc. A clear, normal sample at the main outlet indicates that all is in good condition in the area drained, while a bad sample is a challenge to be followed to the source. Other losses of pulp and visible suspended material are followed in the same manner.

In preventing losses of soluble or fugitive materials, other methods are used. Salt, caustic soda, salt cake, and similar materials must be tested chemically or by hydrometer in order to determine respective values. Bleaching solutions are tested at once before the bleach exhausts. Greatest economy in use of bleaching agents may be obtained by checking the finished pulp for excess bleach just prior to washing. This checking, of course, must be done with a good knowledge of conditions.

In reclaiming furnaces and lime kilns, where there is a hot mass of concentrated chemicals, considerable loss by entrainment may take place. Therefore, constant watching of these operations is essential. The methods of checking losses from such equipment are rather complicated, but careful work permits very accurate figures to be obtained. However, an experienced operator by watching the top of the stack and noting the color of the waste gases, or better still by sticking a cold metal rod or plate into the stack and noting the film formed, can maintain satisfactory operating control.

Leaks and spills are not prevented easily. By constant vigilance, however, they may be kept at a low figure.

J. E. Slaughter
Fire Inspector, Canton plant

Fire Prevention

In each Champion plant there is a well-organized fire department, consisting of a chief, an assistant, a corps of trained firemen, and the most modern fire-fighting equipment. All buildings are equipped with automatic sprinklers. Hydrants and water hose are located at strategic points throughout each plant—buildings and yard. Also a fire house, with up-to-date equipment is conveniently located.

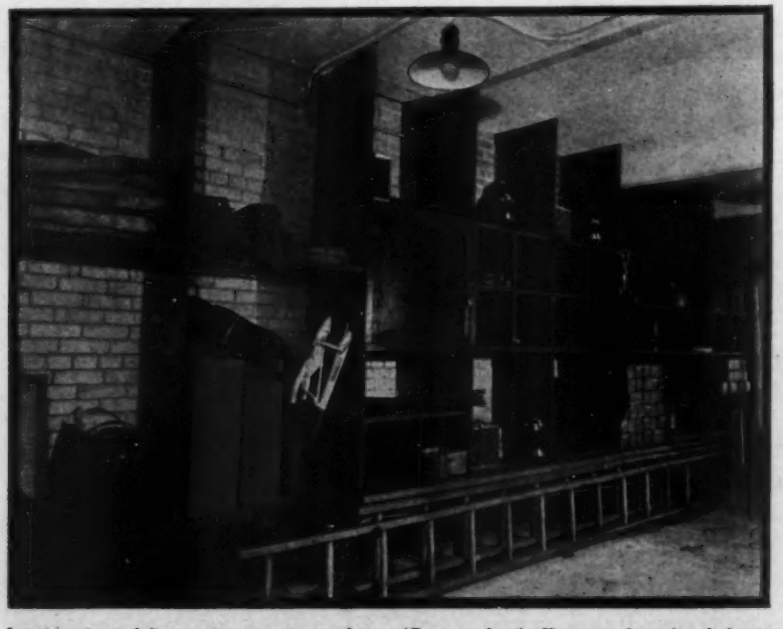
Champion believes that prevention of fire is important. Therefore, a full-time fire inspector is employed. His duties are to make a daily inspection of the plant, report unsafe conditions and have corrections made immediately. The inspector also checks all fire-fighting equipment, such as fire hydrants, hose, fire extinguishers, etc., once a week, to see that each item is in good condition. In addition to the weekly inspection of this equipment by the fire inspector, the room foreman of each department is required to inspect all chemical fire extinguishers in his department, to make sure that they are filled with fluid and ready for instant use. Any extinguishers found empty by a room foreman must be returned immediately to the office of the fire inspector or the inspector must be notified.

Valves on the dry sprinkler system are checked every morning for defects. Chemical extinguishers are tested twice a year. Those extinguishers found to be defective are replaced with new ones and the defective ones are repaired. Much stress is placed on keeping the fire extinguishers, hose, fire pumps, etc., in first class condition.

All fire ladders, both portable and stationary, are inspected regularly and kept in safe condition. Regular fire drills are held, and a fire alarm system, which covers the entire plant, is inspected and tested once a week.

The fire inspector is responsible for the entire fire system and its equipment—also for the inspection of the entire plant and correction of fire hazards.

Thus, by careful and systematic checking and reporting daily or hourly, as the requirements dictate, corrections are made in time to prevent a disruption of operating conditions, and losses are reduced to a minimum.



Interior view of fire apparatus storage house (Canton plant). Here are kept fire helmets, rubber coats, boots, fire hose, pick axes, traffic lamps, gas masks, goggles, ropes, and numerous things needed by fire fighters.

◆

HOW TO CLEAN GLASS TUBES

W. F. SCHAPHORST, M. E.

▶▶▶ I know of nothing better for cleaning dirty glass tubes, including boiler gage glasses, than dilute hydrofluoric acid. In using it, however, extreme care is necessary, because hydrofluoric acid dissolves nearly all substances, including glass.

Glasses to be cleaned should be soaked in a 5 per cent solution of the acid for 15 to 20 minutes, then washed and rinsed in clean water—preferably running water. Blowing out the washed glasses with filtered compressed air will assist further—if such air is available. Usually the results are first class without the air blow finish. Nitric acid, also, does very well, but hydrofluoric is better.

THE CONTACT ANGLE ...

its Role in Paper Sizing

R. M. KARAPETOFF COBB

▸▸▸ SIZING IMPARTS TO PAPER its resistance to penetration by fluids. The harder sized the paper, the slower the rate of fluid penetration into the capillaries.

The resistance of paper to liquid penetration imparted by sizing is always of importance. In this time of emergency, paper is being called on to replace naturally impermeable materials such as tin and plastics, almost to fantastic extent. Under these conditions, sizing is of greater importance than ever before.

Comparison of Paper and Other Containers

To substitute paper for metal and other nonporous materials, it is necessary to reduce the penetration of fluids into paper practically to zero over a long period of time, sometimes over many months of exposure. What has to be done to accomplish this, can be qualitatively shown by comparing what happens when a liquid comes in contact with other containers such as glass or metals, with what happens when a liquid comes in contact with paper.

Nonporous Containers

If a droplet of liquid is placed upon a solid, such as glass or paper, the droplet comes to rest at a definite angle (θ). This angle is called "The Contact Angle" and indicates the tendency of the liquid to wet the solid (Figure 1). When the liquid wets the solid perfectly, the contact angle is zero; and the liquid can spread over the surface instantly or penetrate quickly into the pores, if there are any. When the liquid does not wet the solid readily, the contact angle will be 88 degrees, or higher. Surface contact angles have been particularly well illustrated by Lafontaine (*5*).

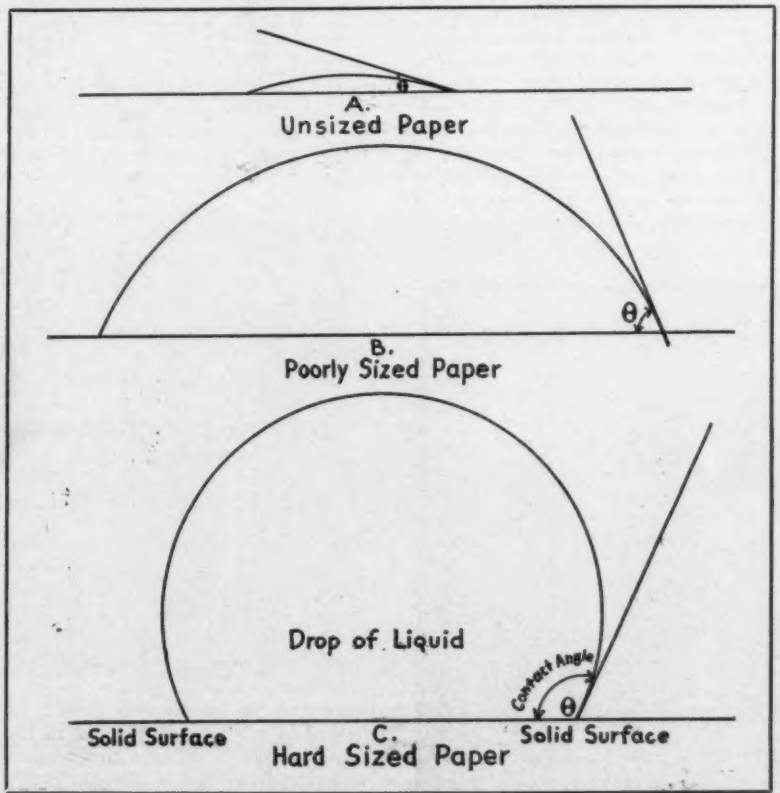


Fig. 1—Contact angles on paper.

A clean glass is wet perfectly by water or oil, yet an unbroken, uncracked glass will hold such liquids indefinitely. The user is so accustomed to this simple fact that he never thinks of asking "Why?" However, the answer to this question would be obvious. Glass contains no pores, and no matter how well a liquid wets glass, there is no capillary path into and through which the liquid can escape from the insoluble glass container.

In the category of nonporous, nonsolvent-sensitive containers will be found such materials as glass, glazed ceramics, metals, and plastics. Nonporous containers will hold any liquid which does not dissolve or swell them (Figure 2).

Porous Containers

In contrast to glass, a clean wire basket or fine-meshed sieve will let water pass readily through the holes. A filter paper will let water through at a rate dependent upon the pore radius. Wherever there are pores, and a liquid which wets the porous solid perfectly, penetration of the liquid will occur.

In the category of porous containers are: unglazed ceramics, wire sieves and baskets, paper and paperboard. Unlike glass, all of these containers possess a capillary structure through which liquids can pass readily, provided the liquids wet the capillary walls.

The paper industry always has been faced with the task of converting its porous product (containing as a rule from 35 to 65 per cent air space by volume) into a suitable container for liquids. In many applications it has succeeded admirably—as, for instance, drinking cups, ice cream boxes, and other short-time liquid exposure jobs. Now paper has been called upon quite suddenly to assume the place of metal and plastic containers while this country's precious supply of tin and lacquers follows the armed forces overseas.

The Contact Angle Theory of Sizing

The reason back of success or failure in substituting paper for metal cans may be found by studying what happens, fundamentally, when paper is sized.

It has been stated herein that a clean wire sieve will let water through at a rate dependent upon the pore radius. But suppose the sieve is coated with a layer of oil or wax (so thin a layer that the holes are not appreciably reduced in radius), then while air, oil, or vapor still can pass readily through the oiled holes, water cannot. Water has too high a contact angle against the oiled wires to wet them, and if the sieve is not filled too full, water can be carried in it indefinitely.

The principles involved in similarly treating paper pores to convert unsized paper into a material which will hold water, grease, or oil have been concisely covered by the contact angle theory of sizing presented by the author in 1934 (*1, 2*). Based on Washburn's (*6*) equation for the flow of liquids into an empty capillary—

$$l^2 = \frac{r\,\sigma \cos\Theta\, t}{2\,\mu}$$

where

l = depth of liquid penetration in cm.

r = paper pore radius in cm.

σ = surface tension of liquid in dynes/cm.

$\cos\Theta$ = cosine of angle Θ taken by liquid in contact with solid.

t = time of penetration in secs.

μ = coefficient of viscosity in poises. μ Water = .01006 poise at 20 C.

the theory states that sizing can make paper impermeable to liquids only by:

(1) Raising the contact angle of paper against the liquid which the package is to contain, so that the liquid rolls off the paper without wetting it; (2) decreasing the radius of the paper pores, or (3) by doing both.

Application of the Contact Angle Theory to Emergency Packaging

The simplest way to illustrate the application of the contact angle theory to packaging for the emergency is to apply the sizing equation to a typical problem regarding water resistance.

Given the problem of developing a .024-in. container stock—which will hold a colloidal liquid as thin as water perfectly for one year—assume the following values:

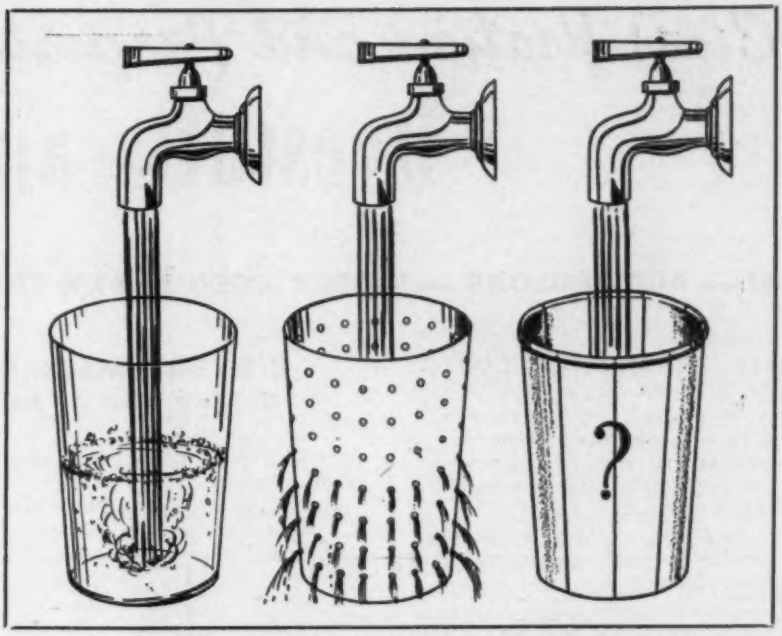


Fig. 2—(left) nonporous, (center) sieve, (right) paper container.

l = .020 in. = .0508 cm allowing penetration of the liquid only three-quarters of the way through the .024-in. stock in one year.

r = .0005 cm. An average value from the data of several investigators.

σ = 50 dynes. An average surface tension value for nondetergent colloids.

μ = .01 poises. The value of the viscosity of water.

$$\cos\Theta = \frac{2\,\mu\, l^2}{r\,\sigma\, t}$$

$\mu = 2 \times 10^{-2}$ poises

$l^2 = 25.75 \times 10^{-4}$ cm²

$r = 5 \times 10^{-4}$ cm

$\sigma = 5 \times 10^{1}$ dynes

t = 1 year = 3.15×10^{7} seconds

$$\cos\Theta = \frac{2 \times 10^{-2} \times 25.75 \times 10^{-4}}{5 \times 10^{-4} \times 5 \times 10^{1} \times 3.15 \times 10^{7}} = 6.553 \times 10^{-11}$$

When $\cos\Theta$ = .00000000006553

Θ = 1 billionth of a degree less than 90 degrees.

Thus by simple computation, it is evident that if a watery liquid is not to penetrate more than 0.020 inch into the paper container stock in one year, the contact angle of the container against the liquid must be held within one-billionth of a degree of 90 degrees throughout the year of exposure.

A contact angle held within one-billionth of a degree of 90 degrees is better treated as a mental concept than a mensurable quantity. To measure it directly is beyond the accuracy even of the excellent methods described by Lafontaine (*6*), Codwise (*3*), or Kovalevski (*4*). (However, it may be readily determined indirectly on the Cobb sizing tester described in TAPPI Official Standard T-441 m-40.)

Summary

If the nutrition of the armed forces and the nation should depend to any extent upon the facile distribution of food in paper containers; if metal consumption is to be reduced by replacement of cans of lubricating oil, dog food, drugs, or similar commodities with suitable paper stocks; if, briefly, paper is to fulfill the opportunities for service open to it, paper technologists must (1) maintain the contact angle of the paper stock against the contents of the container at practically 90 degrees throughout the life of the package; (2) reduce the capillary pore size of the paper stock to practically zero throughout the time of exposure; or (3) best of all—do both.

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Classification and Properties of Dyestuffs and Pigments

II — ACID COLORS — DIRECT COLORS AND THEIR DYEING MECHANISM

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E. I. du Pont de Nemours & Company, Inc.

▸▸▸ AS POINTED OUT EARLIER, the acid dyes are the salts of color acids, generally the sodium salts of color sulphonic acids. Some of the members are quite old and were prepared by sulphonating the bases of the earlier known basic dyes.

As a class, acid dyes are characterized by generally high solubility in water; more so than other dyes.

They have good affinity for animal fibers, such as silk and wool, dyeing them readily from a mildly acidic bath. They possess no affinity whatever for cellulose, and are retained in beater dyeing only as the result of a complex color-size-alumina agglomerate which is not held by the fiber any too securely. They cannot be dyed in waterleaf sheets alone or by the use of alum without size. Alumina, however, does cause some degree of particle agglomeration and permits retention to a limited extent. The combination of size and alum is essential in beater dyeing acid colors although certain members may not be efficiently retained as will be discussed later.

Because as a class they have no affinity for either purified or lignified cellulose, they generally produce smooth dyeings on sized mixed furnishes and will not cause graniting.

Their lack of affinity for cellulose is not only manifested by the fact that the white waters are more heavily colored, particularly in deep shades, but also by the comparative ease with which the color is extracted from the finished paper with water. Consequently, they are not recommended for the beater dyeing of papers which carry a fastness to water bleeding specification.

Their high solubility, as a class, makes them especially adapted to surface coloring. Consequently, they are used to a large extent for calender coloring, dipping, and other forms of surface staining. These surface colored papers are dyed more or less mechanically. The color redissolves and bleeds profusely if the paper subsequently becomes wet—a tendency entirely in keeping with two of the important characteristics of acid colors (their high solubility and lack of affinity for cellulose).

It is recognized that when sodium is replaced by other metals, a salt of lower solubility generally results. This principle is utilized in connection with acid colors. Calcium, barium, strontium, magnesium and lead salts of the acid colors are frequently prepared for use in lake and pigment fields. Soluble salts of these metals are sometimes used in the beater dyeing of acid colors to assist retention through the formation of a color salt of decreased solubility. Occasionally, paper surface dyed with acid colors is subjected to additional treatment with metal salts or with compounds which form with the dyestuff complexes of reduced solubility. As a rule, these after-treatments are not particularly successful. Generally, they result in apparent loss of strength and brilliance, in addition to being difficult operations mechanically.

VII—Anthraquinone Acid Colors

1054 Anthraquinone Blue B, BN; Alizarine Blue SAP; Alizarine Sapphire B; Alizarine Saphirol B; Quinizol Blue B; Fast Bond Blue

..... Anthraquinone Blue 3G

This group of colors is much larger than is indicated by mention of the two above members. In fact, the *Colour Index* lists sixty-six members as of the year 1924, and a number of others have appeared since. However, with the exception of these two colors, they are of comparatively little interest in the dyeing of paper, being employed primarily for the dyeing of wool and silk.

They are all derivatives of anthraquinone, as the name implies, and are characterized by the exceptional light fastness properties of colors containing this nucleus. The anthraquinone vat dyes are the fastest dyestuffs known. The anthraquinone acid dyes may be considered superior to other acid colors in fastness to light with very few exceptions.

These dyes have fairly good solubility but as a class are less soluble than most acid dyes. Furthermore, they possess generally lower tinctorial value. This characteristic and the fact that they are relatively expensive to manufacture accounts for their lack of wide acceptance by the paper trade. The single exception is Anthraquinone Blue B[3] which is used for the very good reason that it is the only blue dyestuff known to possess the property of non-two-sidedness. Consequently, it finds wide use in the coloring of blue and green bond papers.

However, this property of non-two-sidedness of Anthraquinone Blue B must not be associated with the fact that it is an anthraquinone acid color. Other members of this class do not appear to react similarly. Two-sidedness and chemical constitution have virtually no relation, as will be demonstrated later under the discussion of two-sidedness.

Anthraquinone Blue 3G finds some use in surface coloring where it produces fairly bright greenish blue shades of exceptional fastness to light.

VIII—Triphenyl Methane Acid Colors

666 Green BL Conc.; Acid Green G, 2G, L; Guinea Green

735 Green NV Conc.; Alkali Fast Green 2G; Naphtalin Green V

737 Green S, SN Extra; Wool Green S, BSNA; Water Green S

671 Brilliant Blue E; Alphazurine FG; Neptune Blue; Erioglaucine

714 Brilliant Blue A; Patent Blue AF; Alphazurine A

..... Brilliant Blue RR

..... Soluble Blue G, B Conc.; Acid Blue B

(3) This dye is generally offered in two shades, one somewhat greener than the other.

707 Soluble Blue R, 3RPA; Acid Blue R
698 Violet C4B; Acid Violet 4BNS
697 Violet S4B
..... Violet 4BL
696 Fast Violet 10B; Fast Acid Violet 10BD
667 Brill. Milling Green B, 6B; Fast Acid Green B; Neptune Green SGXA; Night Green A

These colors have a number of characteristics which sets them distinctly apart from other acid dyestuffs. With Soluble Blues R and G as exceptions, they are quite fugitive to light and are inferior in this respect to all other classes. This lack of light fastness, closely approximating that of basic colors, may be largely overcome by the use of tannic acid. A quantity equal in weight to the dyestuff is added to the beater following the color and prior to the addition of size and alum. Light fastness is greatly improved by this procedure which is effective only for this group of acid colors and the Nigrosines.

Furthermore, these dyes are capable of a dyeing phenomenon possessed by no other acid colors; i.e., preferential affinity for unbleached sulphite and unbleached kraft. It was stated that acid dyes were generally incapable of affinity for cellulose and that they required both size and alum for retention. This statement most certainly is true except for the triphenyl methane acid group which is substantative to a considerable degree to unbleached sulphite and unbleached kraft. The use of alum alone on strictly unbleached furnishes causes somewhat better and almost complete retention of the color—even a little more than if both size and alum are used.

These dyes cannot be efficiently dyed on unsized bleached furnishes but may be held in up to moderately heavy shades on sized bleached furnishes.

The triphenyl methane group is generally high in tinctorial value and contains some of the most brilliant acid colors known. However, the range of shades is noticeably lacking in yellows, oranges, and reds.

IX—Azo Acid Colors

138 Metanil Yellow Conc., M3X; Yellow MXX
151 Orange II, Y, A; Acid Orange II, Y, XX
161 Orange RO, RR; Acid Orange R, RR
27 Orange G, 2G; Acid, Wool or Light Orange G, 2G
234 Silk Orange R Conc.; Leather Orange R; Resorcin Brown G, 5G, Y, L
..... Brilliant Crocein FL; Red ADX, Azo Scarlet Y; Crocein Scarlet FP Conc.
252 Crocein Scarlet N Extra, MOO, MOOP; Brilliant Crocein 3BA
..... Ruby PL Conc.
176 Fast Red AS, A, S; Roccelline
..... Light Red BL, BA; Fast Red BL, GL
..... Carmine 2B
31 Carmine 2G; Azo Phloxine 2G, GA; Fast Crimson GR
57 Carmine 6B; Azo Fuchsine 6B; Fast Red or Crimson 2B, 6BL
179 Rubine R, AW, B; Carmoisine B, BA; Azo Rubine C, R, X
208 Fast Blue R, 2R, SR; Acid Blue RA, SR; Wool Blue R
209 Fast Blue SB, B; Wool Blue B; Acid Blue BA
90 Violet 6R
246 Blue Black SX, 2R, B, G; Acid or Naphthylamine Black 10BN; Buffalo Black NB

This group is the largest and most difficult group of acid colors to discuss. The number of colored compounds obtainable by the diazo reaction is virtually without limit. The above list contains only the more important of hundreds of compounds known to exist.

The light fastness of these colors is considered good; however, the range is quite broad with some fairly fugitive colors at one extreme and some very fast colors, like Brilliant Crocein FL and Light Red BL, at the other. But as a class, the acid azo colors are somewhat less fast to light than the acid anthraquinones and considerably faster than the acidtriphenyl methane types.

Their solubility is generally good but this characteristic bears no relationship to the azo nucleus. Solubility of most acid as well as direct colors is almost entirely a function of the number and position of the sulphonic acid groups attached to the nucleus and the relation of this number to the size of the molecule. It so happens that the azo acid dyes are relatively simple mono-azo or disazo (containing two azo nuclei) compounds with up to three solubilizing groups per molecule and with a solubility that is generally quite high.

Not all acid dyes may be efficiently retained in the beater by any normal procedure. This distinction is more closely related to color solubility than to any other single factor. The least soluble acid dyes are generally the ones best retained in beater dyeing. The extremely soluble members do not form sufficiently insoluble complexes with size and alum to be retained to any worth-while degree. Consequently, they are used for surface coloring.

This line of demarcation is not sharp, and a number of acid colors may be retained fairly well when they are beater dyed in light shades but not in medium or heavy shades.

Crocein Scarlet (C. I. No. 252) is just about on the borderline for beater retention. Needless to say, the more soluble members, which are generally unsuited to beater applications, are ideal for surface coloring at the calender stacks or in dipping operations.

The three acid oranges serve as a good illustration. Orange II is of intermediate solubility. It is employed extensively in both beater and surface coloring. Orange RO, used almost exclusively for beater work, is less soluble. In surface dyeing, it tends to gel in highly concentrated aqueous solutions. Orange G is too soluble to be well retained in the beater. Consequently, it is used almost exclusively in surface coloring.

The azo acid colors show no preferences for any particular fiber, bleached or unbleached. A few members, however, like Brilliant Crocein FL and Ruby PL actually have a small affinity for cellulose. They are accordingly retained to a somewhat better degree than most acid colors when applied with size and alum.

Most acid dyes, perhaps because of their lack of affinity for cellulose and high solubility, show a strong tendency to migrate to the surface of the sheet on drying. This phenomenon termed "burning to the surface" is experienced probably to the greatest extent with the azo acid class.

X—Pyrazalone Acid Colors

640 Tartrazine Conc., C, O; Wool Yellow
636 Light Yellow GG, 3G; Wool Yellow 3GL
639 Light Yellow GX, GG

This relatively small group is really a subdivision of the azo class since its members contain the characteristic azo (–N=N–) linkage. However, they also contain the five membered pyrazole ring and are mostly yellows and oranges.

As a class, these colors possess very good light fastness and high solubility; and are not suited to beater dyeing. The most prominent member, Tartrazine, has been known since 1884. It is probably the most soluble dyestuff in regular use.

XI—Nitroso Acid Colors

5 Naphthol Green B Conc.

The most important member of this very small group of dyes is Naphthol Green. This product is not retained well in beater dyeing and is used in the paper industry primarily for sur-

face dyeing. Its major attribute is good light fastness.

XII—Nitro Acid Colors

10 Paper Yellow L Conc.; Naphthol Yellow S, L Conc.

This group also is very small. Its most important member is listed above. Naphthol Yellow is quite fugitive to light and to most other destructive agents. It is so extremely soluble that it cannot be employed in beater dyeing and is used exclusively in calender coloring and dipping.

XIII—Quinoline Acid Colors

801 Quinoline Yellow, Conc.; Chinoline Yellow D, W

..... Quinoline Yellow P Extra Conc.; Direct Chinoline Yellow; Brilliant Pure Yellow 6G

The most important members of another very small group of colors are listed above. Both are used in the production of canary shades on bond and are generally relatively non-two-sided, particularly the former. Likewise, both are of very good light fastness.

Quinoline Yellow P Extra, the so-called direct type, is one of those borderline colors between the acid and direct classes but properly belongs with the acid colors. It is very poorly retained without size and alum and is not appreciably improved in this respect by the use of salt or heat, a characteristic which certainly does not justify its classification as a direct color. Its general retention properties, however, are considerably superior to those of most acid colors.

XIV—Nigrosine Acid Colors

865 Nigrosine WSB, WSJ, O2P, J, OPG, etc.

The Nigrosines are highly complex azine colors of unknown structure. The molecule is so large that these colors react more like pigment dyes, and accordingly produce extremely two-sided sheets. They are superior in light fastness to the average acid color, but like the triphenyl methane types are improved in this respect by the use of tannic acid.

The so-called jet shades possess the same properties as the bluer shades.

XV—Xanthene Acid Colors

758 Fast Violet VR, R, B; Fast Acid Violet 4R, A2RN, 4RD; Violamine RR, 4R, A2RN

768 Eosine B, G, J, Y, YS

779 Rose Bengale

These colors are seldom used in beater dyeing because they are retained very poorly. Their primary use is in surface coloring and occasionally coating where they produce extremely brilliant bluish red shades. They are by far the brightest acid reds but are quite fugitive to light. Other members of this group include Erythrosine, Phloxine, and Fluorescein which are rarely, if ever, used in coloring paper.

DIRECT COLORS AND THEIR DYEING MECHANISM

As stated previously, the direct colors are sodium salts of color acids like the acid dyes, but differ in being substantive to cellulose. They further differ from acid dyes in a number of other respects. They are less soluble; they are generally much more complex in constitution. Their aqueous solutions are considered to be highly colloidal in contrast to the monomolecular state of the acid colors. These properties are all inter-related to a considerable extent and unquestionably have a bearing on affinity for cellulose.

However, it should be appreciated that the mechanism by which cotton is dyed with direct colors in the textile industry differs in degree as well as in kind from the processes by which direct colors are attached to paper-making fibers in beater dyeing.

The dyeing of cotton is generally carried out at a temperature slightly under the boil (about 190 Fahr.) from a bath containing in addition to the dyestuff a soluble sodium salt such as common salt (sodium chloride) or Glauber's salt (sodium sulphate). Both the high temperature and the salt concentration are essential to efficient dyeing. At room temperature the dyeing of cotton proceeds very slowly and several days are required to accomplish what may be done in a few minutes at 190 Fahr. Without the salt, no dyeing whatever would occur because it has been established that salt free direct dyes have no affinity for pure cellulose in the absence of electrolytes. The addition of only a trace of sodium salt will cause the dye to be retained on the fiber. As more salt is added, more dye is held until a maximum is attained. Further salt additions after this point is reached progressively decrease retention to the point where dyeing is completely inhibited. It is also known that the addition of salt causes agglomeration of the dyestuff particles, and, if a sufficient quantity is added, the dye is precipitated from aqueous solution. However, in the dyeing of cotton, the dye particles actually penetrate the cotton fiber, and are presumably anchored there by attractive forces of one kind or another. It has been suggested that the once weakly negative fiber becomes positive through adsorption of cations from the salt and is, therefore, capable of attracting the colored anion of the dye.

In the beater dyeing of paper, it is quite likely that a portion of the dye is held by the same mechanism as in the dyeing of cotton. The extent depends on the conditions of dyeing. For example: When direct colors are employed in the beater dyeing of waterleaf sheets, it is customary to heat the beaters to around 120 Fahr. for the deeper shades, and add from 50 to 100 lb. of salt per beater. Sometimes alum is used and sometimes not. When it is not used, it seems reasonably safe to assume that the dye retained in the sheet is held by the same mechanism that obtains in the dyeing of cotton. However, when alum is used, part of the dye is unquestionably held in an altogether different fashion.

This fact may be illustrated by beater dyeing a number of direct colors in a variety of ways in which the variables of temperature, salt and alum are each considered separately. It will be found that in medium depth shades the retention of the average direct color at room temperature and without salt or alum is relatively poor. Some colors are retained as much as 70 per cent, others as little as 20 per cent. The average is well below 50 per cent. If salt is added, the retention is generally improved. If heat up to 130 Fahr. is applied instead of salt, the improvement in retention is less or is insignificant, depending upon the color. If both salt and heat are used without size or alum, the dye is held as well or slightly better than with salt alone. In most cases, retention is nearly complete. However, if alum is used, the retention is practically complete even at room temperature, but a duller color results.

For the production of very deep shades, it is well to use salt and apply heat; but the key to efficient retention lies in the use of alum.

In sized papers, the dye retention with size and alum is essentially the same as when alum is used in waterleaf papers; i.e., practically complete. The use of size which was all-important in the beater dyeing of acid colors is without material significance in dyeing direct colors *provided alum is used.*

To return briefly to the possible mechanism of paper dyeing using direct colors, the vast improvement in dye retention when alum is used indicates that alum plays an important role, and, such being the case, the mechanism must differ from that of cotton dyeing. One modern concept suggests that the color is held on the exterior surfaces of the fiber by the alumina resulting from hydrolysis of the alum in much the same fashion as

size is held. The positively charged alumina here acts as an "electrostatic cement" between the negatively charged fiber surface and the negatively charged dye particle. There is much to support this contention, and, while it may be only a part of the true picture, it is at least substantiated by microscopic examination of the direct dyes on papermaking fibers. Upon such examination, the dye in the form of relatively large agglomerates appears to be anchored or "plastered" on the exterior of the fibers. This phenomenon is not merely a question of difference of fiber because samples of the same rag half stock dyed by the conventional cotton dyeing technique in one case and in another by the customary beater dyeing procedure, present an entirely different appearance under the microscope. Furthermore, the use of materials other than alumina which also exert a strong positive electrokinetic charge permits improved retention. Moreover, the retention of direct colors may be efficiently achieved by the use of a colloidal solution of alumina instead of alum. Increase in the quantity of alumina causes increased dye retention up to the point of almost complete utilization of the color, provided the *p*H is maintained within the optimum range of 4.6 to 6.0 for most direct dyes.

It also is possible, when using alum, to increase dye retention by the partial neutralization of the alum with soda ash. This procedure causes abundant quantities of alumina floc to form which seem so essential in holding the dye.

It also has been suggested that there may be a partial formation of the alumina salt of the dyestuff. There is some evidence in support of this contention. Whether the turbidity and eventual precipitation which results from the addition of alum to a solution of many direct dyes is a separation of the aluminum salt of the dyestuff, or is a mere salting out of the sodium salt, or is a complex resulting from the mutual attraction of negatively charged color and positively charged alumina has not yet been determined. However, the light fastness of direct colors dyed without alum is vastly superior in the majority of instances to that which results from the use of alum either with or without rosin size. This little known phenomenon clearly demonstrates that the alum has either altered the mechanism by which the dye is retained or has altered the dye itself. A duller shade almost invariably results from the use of alum.

These facts, together with many others, lend abundant proof to the statement made earlier that only a portion (and generally a very small portion) of the color in paper dyeing is held in a manner analogous to textile dyeing, and that the balance is in some way associated with alumina on the fiber exterior.

The direct colors as a class are quite securely attached to the fiber and are

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SOME REFINEMENTS IN PERMANGANATE NUMBER TEST METHODS

C. L. SMITH, Assistant Chief Chemist
National Container Corp.

▸▸▸ ALTHOUGH SOME KIND OF permanganate number is used in most kraft pulp mills as a means of control of pulp hardness, there is wide divergence in methods employed for making the test. And in all too many instances, there is too little real correlation between the results and the pulp quality.

As Fuller pointed out *(Paper Trade Journal,* Jan. 23, 1941) probably the greatest stumbling block in the way of accurate pulp tests is getting a correct weight of sample. His method of quick drying by means of a volatile liquid, such as acetone, which leaves the sample in condition for quick slushing, was a big improvement over methods commonly used—such as relying on pressure alone to give uniform moisture content of all samples. Under present war time restrictions, however, the difficulty of obtaining these volatile liquids and the high cost of what can be obtained almost precludes the use of Fuller's method. Consequently, it was deemed necessary to devise some method of getting accurately weighed oven-dry samples which could be put back into slush form instantaneously without resort to these high-cost strategic materials.

In studying this problem, it was not found difficult to dry a one gram (O.D.) sample quickly and if the sample had not been compressed (e.g. between squeeze rolls), it would take up water instantaneously. Apparently it was not so much the use of a volatile liquid as the absence of compression which had produced the beneficial results. The method devised and the one now used by the mill with which the author is associated is as follows:

Unscreened pulp is screened and all pulp washed thoroughly with water. Then a sufficient amount of pulp is poured onto a pad mold and excess water pressed out. This pad is folded once, placed in a felt and run through a wringer three times. A sufficient amount of this wet pulp is taken to give at least a one gram sample of oven dry pulp. The weight of wet pulp taken will depend on the setting of the wringer and the size of the pad. The wringer can be set and the pulp pad size standardized so that a constant wet weight may be taken.

The wet sample so obtained is slushed in a beaker of water and poured on a filter paper on a Büchner funnel and the excess water drawn out by suction. The filter paper plus pulp is placed on a hot plate (without pressure) for a few minutes and then the pulp is separated from the filter paper and weighed in a hot balance. If the sample weighs more than one gram, enough dry fiber may be discarded to bring the sample down to exactly one gram. In actual routine testing, a small variation from exactly one gram is allowed and a graph is used for correction to one gram.

After the dry pulp sample is obtained, it is moistened with a little of the sulphuric acid which is used in making the test. When the pulp sample so prepared is placed in the reaction mixture, the fibers disperse at once, allowing action of the permanganate on all fibers from the instant the pulp is added.

As Fuller also pointed out, the temperature of the reaction mixture exerts an influence. Not agreeing with Fuller, however, as to the advisability of adopting a temperature near the boiling point, more nearly "room temperature" being thought to be better, our reagent bottles are placed in a water bath in which the laboratory tap water is circulated. This procedure does not give exact temperature control but is better than no regulation at all.

difficult to extract with water. This fastness to water bleeding varies; but no member may be considered poor in this respect. A related condition is their tendency to produce granite fibers unless carefully handled. This phenomenon is analogous to that portion of the cotton dyeing mechanism in which dye adsorption is a function of concentration. When hot or concentrated direct color solutions are added to the beater, the fibers first contacted adsorb a much greater quantity of dye and remain more deeply colored in the finished sheet, producing "hairs" or unintentional granite effects. Since the dye precedes the addition of alum, the alumina is not a contributing factor. The remedy is to avoid hot or concentrated dye solutions. Addition of size (but not alum) before the dyestuff is also of assistance.

As a class, the direct colors are insoluble in alcohol and most organic solvents. They are of good fastness to light; but the range is quite broad, and some colors are rather poor (particularly when dyed with alum) while others may be considered excellent.

It is difficult in discussing the direct colors to generalize concerning the relationship between properties and chemical nuclei as was done in the case of the acid and basic types, because practically all direct colors belong to one class (azo).

Most dyestuff suppliers use registered trade-marks as a part of their nomenclature. Among those in use for direct colors are such terms as "Pontamine," "Benzo," "Diphenyl," "Erie," "Fastusol," "Niagara," "Pheno," etc. In the following list, these prefixes have been omitted.

XVI—Thiazole Direct Colors

814 Fast Yellow NNL, NN, 2GLL, FF, 3AP; Yellow LRRA
814 Fast Yellow BBL, B; Yellow BL, B, LRTF, LRTA
814 Fast Yellow WBF, WB

These products are generally offered in two shades, a reddish and greenish yellow; or, in three, in which case an intermediate shade is included. All types are closely related and are characterized by good all-round fastness properties, particularly to light, alkali, and chlorine. In fact, they excel all soluble dyestuffs in chlorine fastness.

As for dyeing properties, they are poorly retained in waterleaf papers without alum unless salt is used or unless both salt and heat are employed in which case maximum strength is obtained. Heat without salt has less influence than salt without heat regardless of whether or not size is used. In sized papers, improved retention results from the use of salt or somewhat better yet, salt and heat. This procedure is recommended for heavier shades.

XVII—Stilbene Direct Colors

620 Stilbene Yellow G, GA, TP; Fast Yellow 95, FA; Yellow FR, 2RR, 2G
621 Fast Orange MRL, MGL, 6R, 5RA, 5RS, 5RP, CG; Orange O, 2R
622 Yellow SX, SXP, SXR, SXG, S3G, 3G, GC, AF, SGP, S2GP; Fast Yellow AP; Direct Yellow OPN, OPA; Direct Fast Yellow 3G
..... Fast Yellow L2RX, L3RX

The stilbene yellows and oranges are all closely related, and most manufacturers offer a number of products ranging from bright greenish yellows to reddish oranges. They are fast to chlorine and fairly fast to light, but are turned redder by alkalis with the exception of C.I. No. 622 which is fairly fast in this respect, particularly the greener shades. These colors are among the most economical direct dyes to use.

In dyeing properties, the stilbene colors have quite a number of characteristics in common. The use of heat seems to have absolutely no influence on their retention, regardless of whether other assistants like salt are used or whether the furnish is sized. They cannot be efficiently applied at a high *p*H unless rather large quantities of salt are used. They are poorly retained alone; i.e., without salt or alum but are greatly assisted by salt. The most efficient way to dye these colors is to use salt, either common salt or Glauber's salt, and this is true whether the furnish is sized or waterleaf.

Further proof of the statement made earlier about the lack of relationship between two-sidedness and chemical constitution may be found in the behavior of these stilbene colors. All produce rather severely two-sided sheets—that is, all except the intermediate green shade (not the greenest member) of C.I. No. 622, which is considered fairly good as regards non-two-sidedness.

The stilbene colors as a class possess quite good affinity for clay and in particular the redder shades of No. 622.

XVIII—Azo Direct Colors

Group A—Derivatives of J-Acid

326 Fast Orange S, SEA
326 Fast Orange WS, WSA, 2RS, SO
326 Fast Scarlet 4BA
326 Fast Scarlet G, GS, YA
327 Fast Scarlet 4BS, 4BSA, SE
278 Fast Red 8BL; Pink GX; Fast Scarlet 9B
..... Red 12B Conc.; Fast Pink G
..... Brilliant Violet B, BN, BA
319 Fast Heliotrope B, 2RLA
533 Fast Blue 4GL
..... Fast Blue 8GL
319 Fast Blue RRL; Blue RL

Group B—Derived from Diamines of the Benzidine Class

415 Orange R, RN
596 Brown D3GN, 3GXX, D3GA, 3GN
..... Brown N3G, CN
420 Brown RMR, M; Fast Brown 3RB
..... Catechu G, GN; Catechine G
382 Scarlet B, BA; Fast Scarlet B, 3B, 4B
370 Congo Red, 4B; Congo 4B; Direct Red DC
448 Purpurine 4B Conc.; Red 4B; Benzopurpurine 4B; Direct Red DCB
375 Bordeaux B; Garnet R, B; Congo Corinth GA
394 Violet N, NBA, 2R, 3R
472 Blue BX, BR
406 Blue BB, BBN, 2BN, 2BHM
520 Sky Blue 5BX, A; Sky Blue; Blue 7BN
518 Sky Blue 6BX, FF, 6BA, 6B
502 Blue AX, G; Azurine G; Brilliant Blue BT
401 Deep Blue BH Conc.; Diazo Black BHSW Conc.; BHN, BHD
593 Green BX, BY, MT, BG
594 Green GX, GY, GA
581 Black E, EE, EAP, BF, GX, SGN; Direct Black E, GX; Fiber Black N; Paper Black RB

Group C—Miscellaneous

364 Brilliant Paper Yellow; Brilliant Yellow C; Brilliant Fast Yellow G2N; Paper Yellow 3GXA
365 Yellow CH, Y; Chrysophenine, ESN, YA, G
..... Fast Yellow 4GL
346 Fast Yellow 5GL
..... Fast Orange EGL, EG; Orange L5GA
..... Fast Orange ERL; Orange L3RA
130 Fast Pink EB Extra

The sub-classification of the azo direct colors into the three above groups is admittedly subject to criticism because generalization within this class is next to impossible. However, there are a few differences which perhaps justify this grouping; for example, the J-Acid derivatives when dyed on paper are all quite fast to light. This characteristic is in particular contrast to Group B which, as a

class, is only fair, especially when dyed with alum, and no member of which is considered especially fast to light, i.e. without special treatment such as the use of copper salts with Nos. 518 and 502.

Furthermore, the colors of Group A show moderate improvement in retention when dyed with salt as well as when heat is applied, and give maximum results with both. The colors of Group B, on the other hand, are scarcely affected by heat; but their retention is greatly increased by using salt. There are admittedly a few exceptions to these rather sweeping statements, the most notable being No. 502 which is uninfluenced by salt but greatly improved by the use of heat.

Further generalization is impossible. All classes contain members which when dyed alone without salt, heat, size, or alum are very poorly held, such as Nos. 278,406,364, and 365. Under the same conditions, others such as No. 327, 394, and 581 are quite efficiently retained. In fact, the acid sensitive types, Purpurine 4B, Congo Red and Orange R, also could have been included in this latter category.

Fastness to Acid and Alkali

Perhaps, it is opportune to comment on the properties of fastness to acids and alkalis. Thus far eighteen different color classifications have been discussed and there has been a reasonably close relationship between color nucleus and dyeing properties as well as fastness properties. It, therefore, may seem a bit incongrous to place in the same class colors like Congo Red, which turns blue with acid; Brilliant Yellow, which turns red with alkali; and C.I. No. 319, which may be anything from a greenish blue to a reddish violet, depending upon the acidity or alkalinity at the time of dyeing. In the earlier part of this work, a dyestuff was pictured as consisting of an arrangement of atoms into a nucleus responsible for the color. Attached to this nucleus or framework were other groups of atoms which imparted other properties to the compound but were not in themselves responsible for the compound being colored or colorless. It is these auxiliary groups of atoms which are largely responsible for acid and alkali sensitivity or for the change in color. The presence of amino ($-NH_2$) and hydroxyl ($-OH$) groups in the dye molecule and, in the case of the azo dyes, the relative positions of these groups with respect to the azo linkages, are responsible in a large measure for the reaction of the dyestuff to acid and alkali. It is thus possible to have several acid or alkali sensitive colors with the same color nucleus.

Because the azo direct color group is so large, this condition is more apparent here than in other classes. It also should be stated in the interest of accuracy that where acid or alkali sensitivity is due to the presence or position of an auxiliary atomic grouping on the color nucleus, the reaction is generally a reversible one. For exmaple, Purpurine, Congo Red, Orange R and Bordeaux B, are turned blue or black with acids, but the color is restored by neutralization with alkali just as the red color formed from Brilliant Yellow with alkali reverts upon neutralization with acid. The color nucleus in these cases has not been destroyed. When it is (such as occurs when many of the triphenyl methane acid colors become colorless by treatment with alkali) the reaction is not reversible, and the color cannot be restored by neutralization with acid.

To return to the dyeing properties of the azo direct colors, the fairly good non-two-sided properties of No. 278 and the excellent non-two-sidedness of No. 364, Brilliant Yellow, should be stressed. The latter is extensively employed in the production of buff and goldenrod bond shades.

***EDITOR'S NOTE:** This article is in three parts. Part I on the subject of basic dyes, appeared in the August issue of this magazine.*

Processing Paper With Colloids

H. S. SCHERBAK

▶▶▶ PRACTICALLY ALL PAPERS defiber in water, are non-resistant to grease, and are combustible. Likewise, most papers can be written upon with pencil or ink only when dry and have surfaces which abrade easily.

There are papers, however, which do not defiber in water, are resistant to grease, fire and abrasion, and which can be written upon even when wet.

Of the nonwater-defibering papers, vegetable parchment and vulcanized fiber are best known. Vegetable parchment is produced from waterleaf paper, which is processed with sulphuric acid on special machinery, then washed and in many cases treated with glycerine or sugar to make it pliable. Vulcanized fiber also utilizes a nonsized paper in its preparation, the paper being treated with zinc chloride on specially-designed processing machines and requiring up to 90 days on heavy sheets to complete the manufacturing process.

Another process for producing nonwater-defibering papers, which is little known in the United States, but used since World War I in Europe, treats practically any kind of paper with specially-selected colloids. These colloids cover the fibers with a fine film which gives the treated papers their nonwater-defibering characteristic and also makes them very resistant to abrasion. With the right selection of untreated paper and processing, it is possible to produce a treated paper that is highly resistant to water, grease, oil, gasoline, alcohol and poison gas, and, in addition, tropics-proof; or paper which is highly resistant to water and at the same time noninflammable, soft and stitchable on sewing machines. Treated paper can also be made tough like the sole leather of shoes or soft like chamois. Such papers can be produced in any color, and printed either before or after processing, or both before and after.

The process consists mainly of saturating untreated paper of standard quality with special colloids in a size press, after which the paper is dried and wound. Such equipment can be built into the dryer section of a paper machine or installed ahead of a coating machine. Even a waxing machine can be adapted to the purpose.

Document or printing and wrapping papers treated in this manner look little or no different than the untreated. Yet, upon testing with water or oil and for dry and wet strength, peculiar and unusual qualities become apparent.

The process may be employed to produce various kinds of paper with special individual characteristics which would permit their use as substitutes for certain uses of textiles, rubber, gutta percha, asbestos, cork, leather, artificial leather, wood, or, even in some cases, for metals.

The treated paper also is suggested for use as blackout paper, for tarpaulins to cover airplanes when in the open or other goods similarly stored, for military maps, for medical tags for the armed forces, and for innumerable other uses where its wet strength and other physical characteristics are of economic advantage.

PAPER SKETCHES

AS EARLY AS
THE 1890'S FRICTION WHEELS, MADE OF LAYERS OF STRAW-BOARD CEMENTED TOGETHER AND HELD BY IRON PLATES, WERE SOMETIMES USED IN PLACE OF SPUR PINIONS TO DRIVE MACHINERY.
STRANGELY PROPHETIC WAS THE UTTERANCE OF ISAIAH, BIBLICAL PROPHET, ABOUT 715 B.C. WHO, REFERRING TO PAPYRUS, SAID: "THE PAPER REEDS BY THE BROOKS, BY THE MOUTH OF THE BROOKS, AND EVERYTHING SOWN BY THE BROOKS SHALL WITHER, BE DRIVEN AWAY, AND BE NO MORE!" ISAIAH, 19:7.
AT ONE TIME
DURING THE EARLY 1800'S, PAPER PATCHES SERVED AS WRAPPINGS FOR BULLETS RAMMED INTO THE MUZZLES OF RIFLES.
FROZEN EGGS ARE BEING PACKAGED IN CELLOPHANE-LINED PAPER-BOARD CONTAINERS BY A NUMBER OF EGG PACKERS AS A CONTRIBUTION TO THE METAL SAVING PROGRAM. ESTIMATES FOR 1942 PLACE THE NUMBER OF EGGS TO BE FROZEN BY EGG-BREAKING COMPANIES AT 3,430,000,000.

LONG-CONTINUED SATISFACTION *Brings Repeat Order!*

This
DE LAVAL
WORM GEAR of 32½ ratio was installed in a coal handling plant in 1928 to transmit 40 hp. to drive an apron conveyor.

Recently the owners bought three more De Laval worm gears, two of them for conveyor drives.

Continuous operation in an atmosphere laden with abrasive dust or moisture has no terrors for a De Laval gear, which is self-contained and self-lubricating and requires no attention further than an occasional checking of the oil level.

Process plants find in mechanical conveyors with De Laval worm gear drives a superior and economical means for moving materials steadily in large quantities over long distances.

Our engineers will be glad to study your requirements and to assist with data and layouts. Ask for Publication W-1133.

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MANUFACTURERS OF TURBINES · STEAM HYDRAULIC PUMPS · CENTRIFUGAL PROPELLER ROTARY DISPLACEMENT · MOTOR MOUNTED · MIXED FLOW · CLOSELY · SELF-PRIMING CENTRIFUGAL BLOWERS and COMPRESSORS · GEARS · WORM HELICAL and FLEXIBLE COUPLINGS

ALLIED

ARMY-NAVY PRODUCTION AWARD

Bauer Brothers Company, Springfield, Ohio — The Army-Navy "E" pennant was conferred on this company for quality and quantity of production in the light of facilities available. It was given in recognition of a resourcefulness and drive that enabled the company to complete its first contract ahead of schedule although new equipment was received months later than expected. It was no small task to cut a full month from the contract, with plant facilities in process of revamping all along the line. Colorful ceremonies marked the presentation of the award on September 4. Representatives of the Army-Navy Ordnance Department, city and state officials, honored guests, company officers, and the entire Bauer office and factory personnel were in attendance.

Hooker Electrochemical Company, Niagara Falls, New York—The new joint Army-Navy award was given this company in recognition of outstanding performance in the production of war materials. This was the first award given to a chemical manufacturer in the New York Chemical Procurement District. Prominent Army, Navy, state, and civic officials, as well as prominent chemists, engineers, and educators attended the presentation at Niagara Falls, September 8.

Leeds & Northrup Company, Philadelphia, Pennsylvania—Ceremonies attending the presentation of the Army-Navy "E" award to this company were held September 5. William L. Batt, deputy chairman of the WPB and president of SKF Industries, Inc., of Philadelphia, made the opening address. The presentation, held in Wister Park, was made by Admiral Henry A. Wiley, U. S. N. (retired), and the award was received by C. S. Redding, president of the L & N Company, and J. L. Johnson, president of the L & N Employee's Association. Lieutenant Colonel Thomas H. Stilwell, Commanding Officer, Eastern Pennsylvania District, Internal Security Force, U. S. Army, was the Army's official representative at the ceremonies. Admiral Wiley and his party inspected the L & N plant after the presentation ceremonies.

The Ohio Injector Company, Wadsworth, Ohio—For high achievement in the production of war equipment, this company received the Army-Navy "E" pennant. Formal presentation ceremonies were held August 24 at the company's plant with Army and Navy officials formally making

the award of the pennant, also presenting Army-Navy "E" lapel insignias to all O.I.C. employees. The expectation of further achievement was conveyed in the official communication from the Hon. James Forrestal, Under-Secretary of the Navy, notifying The Ohio Injector Company of the award. He wrote: "The high and practical patriotism of the men and women of The Ohio Injector Company is inspiring and heartening. Their record will be difficult to surpass, yet the Army and Navy have every confidence that it was made only to be broken.

H. K. Porter Company, Pittsburgh—This company was among the first 35 manufacturers in the country selected by the Army and Navy Departments to receive the joint Army-Navy "E" award in recognition of high achievement in the production of war equipment.

EDITOR'S NOTE: The new Army-Navy "E" Production Award is being presented to manufacturing companies in recognition of outstanding performance in the production of war materials. The Army-Navy "E" pennant is a swallow-tailed banner, bearing a white capital "E" in a yellow wreath of oak and laurel leaves on a vertically divided blue and red background. "Army" appears in white on the red field, and "Navy" appears on the blue field. The new award given jointly by the armed services supplants the present Navy "E" and the previously announced Army "A."

Stickle Steam Specialties Company, Indianapolis, Indiana — No setting could have been more appropriate for ceremonies in connection with the presentation of the Army-Navy Production Award than the scene of this company's presentation. On August 25, shortly after noon, the Army-Navy "E" was awarded to the company on the north steps of the World War Memorial Plaza in Indianapolis.

Other Awards—The S. F. Bowser Company, Fort Wayne, Indiana, received the Army-Navy "E" award last month (Cf. PAPER INDUSTRY AND PAPER WORLD, August, 1942, page 508.

Hammermill Paper Company, Erie, Pennsylvania — This company is the first paper company to be awarded the Army-Navy "E" pennant (see page 570, this issue).

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▸▸▸ AT A CEREMONY held in New York City recently, Lewis H. Brown, president of Johns-Manville Corporation, dedicated a service flag for the 1,792 Johns-Manville men now serving in the armed forces of the United Nations. Of the 1,792 men in service, 1,623 are with the American forces and 169 with the Canadian forces.

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▸▸▸ MORE THAN 25 centrifugal pumps are under construction by Goulds Pumps, Inc., Seneca Falls, New York, for the new $3,000,000 addition to the plant of Southland Paper Mills, Inc., Lufkin, Texas. The pumps will handle white, green, black, and weak liquors, recovery furnace dust, sulphate stock up to 5½ per cent, hot sulphate stock, white water, fresh water and hot water at temperatures up to 260 Fahr.

◆

TIRE CONSERV. DEPT. FORMED BY GOODRICH

The B. F. Goodrich Company, Akron, Ohio, has recently formed a Tire Conservation Department to help conserve rubber and render tire consultant service to truck fleet operators.

John T. Staker has been named manager, and James E. Carhart his assistant. In addition to conserving rubber, this department will function to make possible lower operating costs on tire equipment used by fleet accounts of the company, and to insure as nearly as possible continuous operation of fleet equipment despite the rubber shortage or because of service interruptions due to tire causes.

Grip a Bending V-Belt

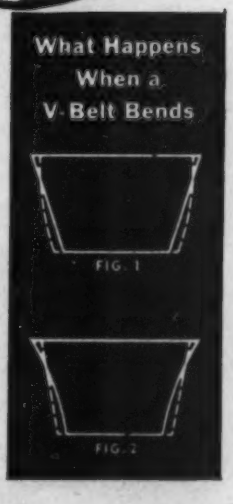
You'll See *How* the CONCAVE SIDE

Saves Belts-Saves Rubber-Saves Power!

Bend *any* V-belt and you can feel it change shape! The top is under tension and grows narrower. The bottom is under pressure—therefore it widens. These two conflicting stresses force a straight-sided V-belt to *bulge* in the sheave groove. (See figure 1 on the right.) This bulging causes uneven wear on the sides of the belt—*shorter life!*

Now look at figure 2. There you see what happens if the V-belt is built with the patented Concave side. The stresses of bending merely straighten the Concave side—making it exactly fit the sheave groove. This means uniform wear and, therefore, *longer life*—a saving in belts, a saving in the Nation's rubber supply. Again, the full side of the belt *uniformly* grips the pulley—carries heavier loads without slipping—another saving of belts and a saving in power too!

Only belts built by Gates are built with the Concave side, a Gates patent.



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Dallas, Tex. 2213 Griffin Street
Portland, Ore. 333 N. W. 5th Avenue
San Francisco, Cal. 2700 16th Street

HELP TO PUT EMPTY CYLINDERS INTO USE

Distribution of compressed oxygen and dissolved acetylene, so necessary for today's wartime production, is dependent upon the supply of cylinders. This supply is still deemed adequate to keep these gases continually and readily available to essential users, if all shops, small and large, will co-operate in speeding up turnover rates. The Linde Air Products Company, a unit of Union Carbide and Carbon Corporation, New York City, has made the following suggestions for doing this.

Cylinders must be kept moving. They must not be permitted to stand idle, either full or empty, for every day a cylinder is idle, a day is lost out of its productive life. Also, refrain from ordering more oxygen or acetylene than is required for immediate needs. Many shops allot not more than three oxygen and three acetylene cylinders to every two welding or cutting outfits in active service. This plan permits a 50 per cent reserve.

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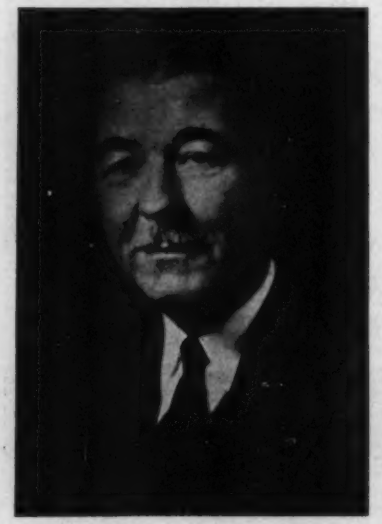
COLUMBIA CHEM. MOVES 3 DEPTS. TO PITTSBURGH

The executive sales office as well as the traffic and advertising departments of the Columbia Chemical Division of the Pittsburgh Plate Glass Company have been moved to Pittsburgh from New York.

A. T. Asplundh, vice president, said in his announcement that the move is a continuation of the company's program of co-ordinating its various divisions in the general office at Pittsburgh. Several years ago the executive office of the Paint Division was moved here from Milwaukee.

W. I. Galliher, director of sales of the Chemical Division will be in charge of sales activities from the new Pittsburgh headquarters.



W. I. Galliher

Highlighting a picnic given by Hudson-Sharp Machine Company, Green Bay, Wis., was the presentation of $25 War Bonds to contest winners. J. M. Conway, president of Hudson-Sharp, is shown at the extreme right as he presented awards to the winners: (L to R) Walter Raymakers, Elmer Peterman, Leonard Bourgeois, and Karl Miller.

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▶▶▶ THE FIRST MODEL HEMP MILL and operator training school center will be constructed in the hemp growing area of Dodge and Fond du Lac counties in Wisconsin. Waupun will be the headquarters for the project. Funds have already been appropriated for the construction of the building which will be temporary but will serve as a model for similar mills sponsored by the Defense Plant Corporation. It will be able to take care of the crop from 4,000 acres, supplementing Wisconsin's 1942 crop of 7,500 acres.

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▶▶▶ TO ASSIST GOVERNMENTAL BUREAUS and other authorized purchasing personnel in their search for companies who can manufacture necessary items, Interchemical Corporation, New York City, has published a "Manual of Products," a compilation of the production facilities and war products being manufactured by all of its divisions and subsidiaries. As a result of this publication, and a series of sales meetings which were held, every salesman is equipped to tell what each division of Interchemical is doing and what each division can make.

▶▶▶ THREE NEW SOUTH AMERICAN sales outlets have been announced by Wheelco Instruments Company, Chicago. Cia Argentina de Ingeneitia Idustrial, with headquarters at 375 Peru, Buenos Aires, will represent the company in Argentina; Miguel Khalife, with A. P. Green Chilena Ltda., at Casilla 13297, Santiago, in Chile; and Benech & Cia, at Cerrito 455, Montevideo, in Uruguay.

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▶▶▶ CELEBRATING 20 YEARS of service to industry, the 15th National Exposition of Power and Mechanical Engineering will be held at the Grand Central Palace, New York City, November 30 to December 5. Planned as a direct aid to war production, the exhibits will be of particular interest to engineers and operation men who are faced with many new production and maintenance problems, as well as the many new men with industrial responsibilities.

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▶▶▶ TO MARK ITS 50th anniversary, the Pittsburgh Plate Glass Company, Pittsburgh, has published a special anniversary edition of its company magazine, *Pittsburgh Plate Products*. The current "Jubilee Issue" traces the history of the company's advertising and production activities over the past half-century. Some of the illustrations of the early days of the company are contrasted with modern ones. The cover is printed with a background of gold and depicts an appropriate illustration of the "nineties."

The paper industry is mobilized for its part in the war program. Cellulose for munitions . . . container board, paper board, building paper, kraft; sulphate writing papers: bonds, ledgers, mimeograph, manifold, papetrie, etc. . . . special papers such as blue print . . . and others . . . all are absolutely essential to the conduct of the war. If your paper production is related to the war effort, or not, perhaps we can help solve your priority problem. Whether for emergency maintenance, repair or replacement of Beaters, Jordans, Screens, Pulpers or respective parts, let us know your requirements.

Jones

E. D. JONES & SONS COMPANY, Pittsfield, Mass.
Builders of Quality Machinery for Paper Mills.

ASSOCIATIONS

MANY FINE PAPERS APPEAR ON PROGRAM FOR TAPPI MEETING

A schedule of events for the fall meeting of the Technical Association of the Pulp and Paper Industry which, although tentative, is somewhat different from an outline of the program formerly published.

The sessions will be held at the Statler Hotel, Boston, September 29 to October 1. The first day, Tuesday the 29th, had formerly been announced as Federal Government Day. However, the later program shows that the Wartime Packaging Session, originally scheduled for Wednesday morning, has been changed to Tuesday, and this session will extend into the afternoon, taking up the entire morning and afternoon periods. The Federal Government Program likewise will include both the morning and afternoon sessions and will be held on Wednesday, the 30th, and will continue through the morning and afternoon periods. At the morning session, David P. Winton, chief of the Pulp and Paper Section of the WPB will speak. The symposium on Tub Sizing first announced for Thursday morning, October 1, will be held on the afternoon of that day.

Although many of the speakers have not yet been announced, the program definitely promises that it will be TAPPI's "Contribution to the War Effort Meeting."

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▶▶▶ A NEW ORGANIZATION to be called the National Association of Suggestion Systems has been formed in a move to speed the pace of war production. E. S. Taylor, director of the Employee Suggestion System of the Pullman Company, was elected president; F. A. Denz of the United Airlines, secretary; and H. C. Marmaduke of the Illinois Central Railroad, treasurer. Three directors chosen in addition to the officers include H. W. Stinworth of Swift & Company, F. R. Evers of the Public Service Company of Northern Illinois, and H. F. Foley of the Peoples Gas Light and Coke Company.

CONVENTIONS AND COMING EVENTS

Sept. 18-19—Fall meeting of the Northeastern Division of the American Pulp and Paper Mill Superintendents Association, Poland Spring, Maine.

Sept. 29-30—American Management Association Conference, Hotel Pennsylvania, New York City.

Sept. 29-Oct. 1—Fall meeting of the Technical Association of the Pulp and Paper Industry, Hotel Statler, Boston.

Oct. 17—Fall meeting of the Northwest Division American Pulp and Paper Mill Superintendents Association, Hotel Wausau, Wausau, Wisconsin.

Oct. 27-29—The Thirty-first National Safety Congress and Exposition at the Sherman, LaSalle, and Morrison Hotels, Chicago.

Nov. 24-29 — National Chemical Exposition, at the Sherman Hotel, Chicago.

Nov. 30-Dec. 5—15th National Exposition of Power & Mechanical Engineering, Grand Central Palace, New York City.

SAFETY

WARTIME SAFETY PROBLEMS WILL BE THEME OF N.S.C.

"Save manpower for warpower" is the theme of the 31st National Safety Congress and Exposition to be held October 27-29. Headquarters will be the Hotel Sherman in Chicago, but sessions also will be held in the Morrison and LaSalle Hotels. (Meetings of the Pulp and Paper Section will be held at the LaSalle Hotel.)

The National Safety Council has announced that the first wartime Congress since 1918 will be devoted completely to the safety job now at hand—to help win the War. The entire program, covering every phase of safety with 175 sessions and 500 program participants, will be centered on the problem of stopping accidents that delay victory by slowing production, impeding the movement of troops and supplies, and wasting manpower, materials, and time.

The Congress is the largest safety event in the world. Attendance averages 10,000, and safety leaders from all parts of the country assemble to exchange ideas, experiences, and problems. Delegates this year will work overtime to cram the program into three days, instead of the usual five, and thus avoid weekend travel.

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SAFETY BANNERS AWARDED TO THREE MASS. PAPER MILLS

Among the manufacturing concerns winning safety banners in the statewide industrial contest conducted by the Massachusetts Safety Council were the Strathmore Paper Company, West Springfield, Old Colony Envelope Company, Westfield, and the Crocker and Parsons Divisions of the American Writing Paper Corporation, Holyoke.

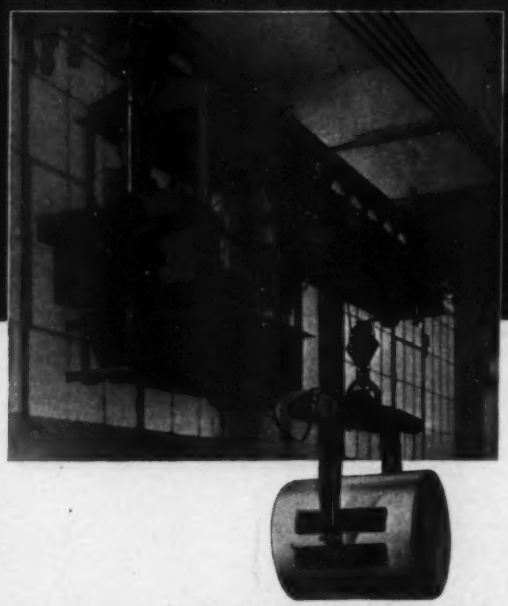
The awards were announced on July 30 by Ralph W. Pendleton, secretary of the contest, who stated that the firms enrolled reported an increase of less than 1 per cent in industrial injuries for the first six months of this year, despite an increase of more than 27 per cent in man-hours worked by employees. More than 317 Massachusetts firms, employing a total of 250,875 persons, were enrolled in the competition.

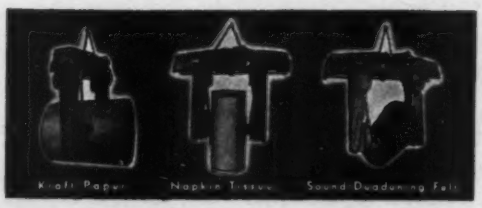
◆

NUTRITION SERVICE AIMED TO REDUCE LOST MAN-HOURS

An industrial nutrition advisory service has been organized under the direction of Dr. W. H. Sebrell, Director, Division of Chemotherapy, U. S. Public Health Service and Deputy Assistant Administrator, Office of Defense Health and Welfare Services and M. L. Wilson, Assistant Administrator, Office of Defense Health and Welfare Services in an effort to reduce the 24,000,000 man-hours lost monthly, according to the Office of War Information.

This service will provide practical recommendations to both government owned plants and private industries to meet specific industrial nutrition problems which may affect production by increasing absences and accidents.





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. . . *in Any Position*

Whether you store your rolls horizontally or vertically, they can be handled easily with a Cleveland Tramrail Roll Handling System. The rolls may be picked up from a vertical position and placed in a horizontal position or vice-versa. They may be taken to and from any part of the mill quickly by the overhead route.

The Cleveland Tramrail roll grab will handle all grades and thicknesses of paper, from light crepe and tissue paper, sound-deadening felt to kraft and hard box-board.

Roll grabs have been made for various size rolls. A grab recently built handles rolls from 16 inch minimum to 60 inch maximum diameter in lengths to 72 inches and weighing up to 5,000 pounds.

A great advantage of the Cleveland Tramrail system is that rolls may be picked up, delivered and set down by the cab operator without his ever leaving the cab. All motions of the grab and motor-driven carrier are controlled by means of controllers in the cab.

Many mills are expediting the handling of rolls at a great savings with Cleveland Tramrail.

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OVERHEAD MATERIALS HANDLING EQUIPMENT

NAMES *in the* NEWS

Personals

A. J. WILEY WILL DO RESEARCH WORK AT THE INSTITUTE

Averill J. Wiley of Spokane, Washington, has been appointed to do research work at the Institute of Paper Chemistry for the Sulphite Pulp Manufacturers Committee on Waste Disposal, it has been announced by Jesse Holderby, committee representative,

A. J. Wiley

also at the Institute. Mr. Wiley has a new process for the treating of sulphite liquor, and an investigation by the committee of his program led to his appointment.

Mr. Wiley received his M. S. degree from Washington State College and did graduate work in fermentation biochemistry at the University of Wisconsin. He is at present assistant bacteriologist for the city of Spokane.

◆

A. R. HERON OF C-Z GIVEN ARMY COMM.

J. D. Zellerbach, president of Crown-Zellerbach Corporation, San Francisco, California, has announced that Alexander R. Heron, vice president of Crown-Zellerbach and industrial relations director of Crown-Zellerbach and Rayonier, Incorporated, San Francisco, has been granted leave of absence by the companies to accept a commission as Colonel, chief of the civilian personnel branch, Services of Supply. Mr. Heron left San Francisco September 2 to assume his duties as chief of the civilian personnel branch, Services of Supply, in Washington, D. C., first attending an army staff meeting at Chicago.

Mr. Heron pioneered the organization of the first industry-wide joint labor management committee on Pacific Coast, which government spokesmen have credited with making an outstanding voluntary contribution to the war's manpower needs, and he represented management of Pacific Coast pulp and paper mills in presenting the plan to the Manpower Commission of the WPB. The plan not only has been described by government spokesmen as one of the most constructive examples of co-operation between unions and management, but has merited government approval on a trial basis for two labor stringency areas in the states of Washington and Oregon.

◆

▶▶▶ At a recent meeting of the Board of Directors of the Norma-Hoffmann Bearings Corporation, Stamford, Connecticut, *Clarence E. Stevens* was elected vice president in charge of plant operations, effective August 15. He succeeds *Charles B. Malone*, who resigned on July 31 to become associated with another industrial business in Stamford. Mr. Stevens was, until April 1, vice president in charge of manufacturing of Electrolux, Inc., at Old Greenwich, Connecticut.

◆

▶▶▶ Assistant sales manager of the Mosinee Paper Mills, Mosinee, Wisconsin, *J. R. Diggs* has been appointed to the kraft paper advisory committee of the Office of Price Administration.

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▶▶▶ Formerly associated with the Bryant Electric Company, Bridgeport, Connecticut, as engineering manager for the Wiring Device Division, *Roy M. Smith* has joined the Roller-Smith Company, Bethlehem, Pennsylvania, as assistant chief engineer. He will devote the majority of his time to design and application of the company's products. Mr. Smith has been active in the American Institute of Electrical Engineers for a number of years and is the author of several articles which have been published in leading magazines serving the electrical industry.

APPOINT DR. DIEHM TECH. DIRECTOR CONTAINER CORP.

Dr. Robert A. Diehm has recently been appointed technical director of the Container Corporation, Chicago. He has formerly been associated with the Rohm and Haas Company of Philadelphia, where he devoted his time to research problems from 1929 to 1937 and to sales problems of a technical nature until July of this year.

Dr. R. A. Diehm

Dr. Diehm received his B. S. degree in chemistry and physics from Purdue University in 1926, M. S. in microbiology from Rutgers in 1928, and Ph.D. from the same school in 1930. While doing post-graduate work, he taught at the New Jersey College for Women at New Brunswick, New Jersey, from 1928 to 1929, and he was research assistant at Rutgers from 1926 to 1929. Dr. Diehm is a member of the Technical Association of the Pulp and Paper Industry and The American Chemical Society.

◆

▶▶▶ Vice president of the Shawinigan Water and Power Company, *J. B. Challies* has been elected a director of the recently reorganized Brown Corporation, Canadian subsidiary of Brown Company, New York City. The Brown Corporation and the Shawinigan Water and Power Company are joint owners of a new power development on the St. Maurice River at La Tuque, Quebec.

SHIPS *and more*

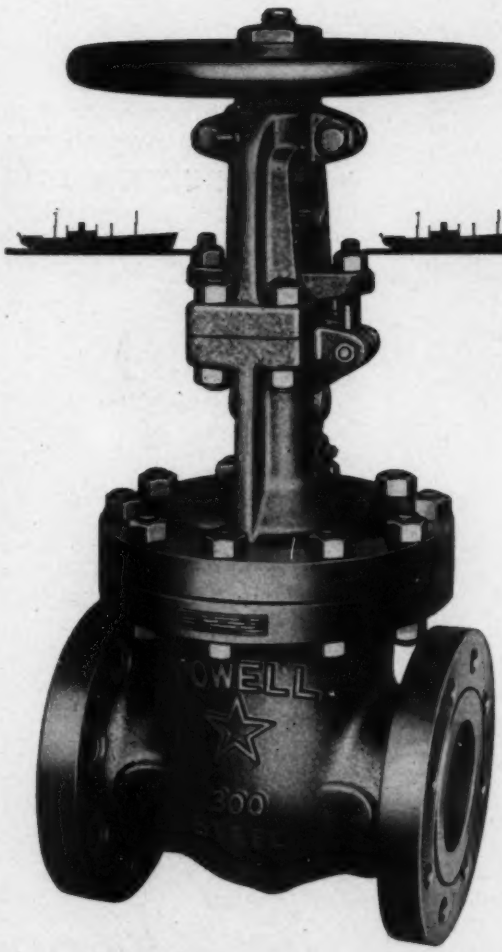
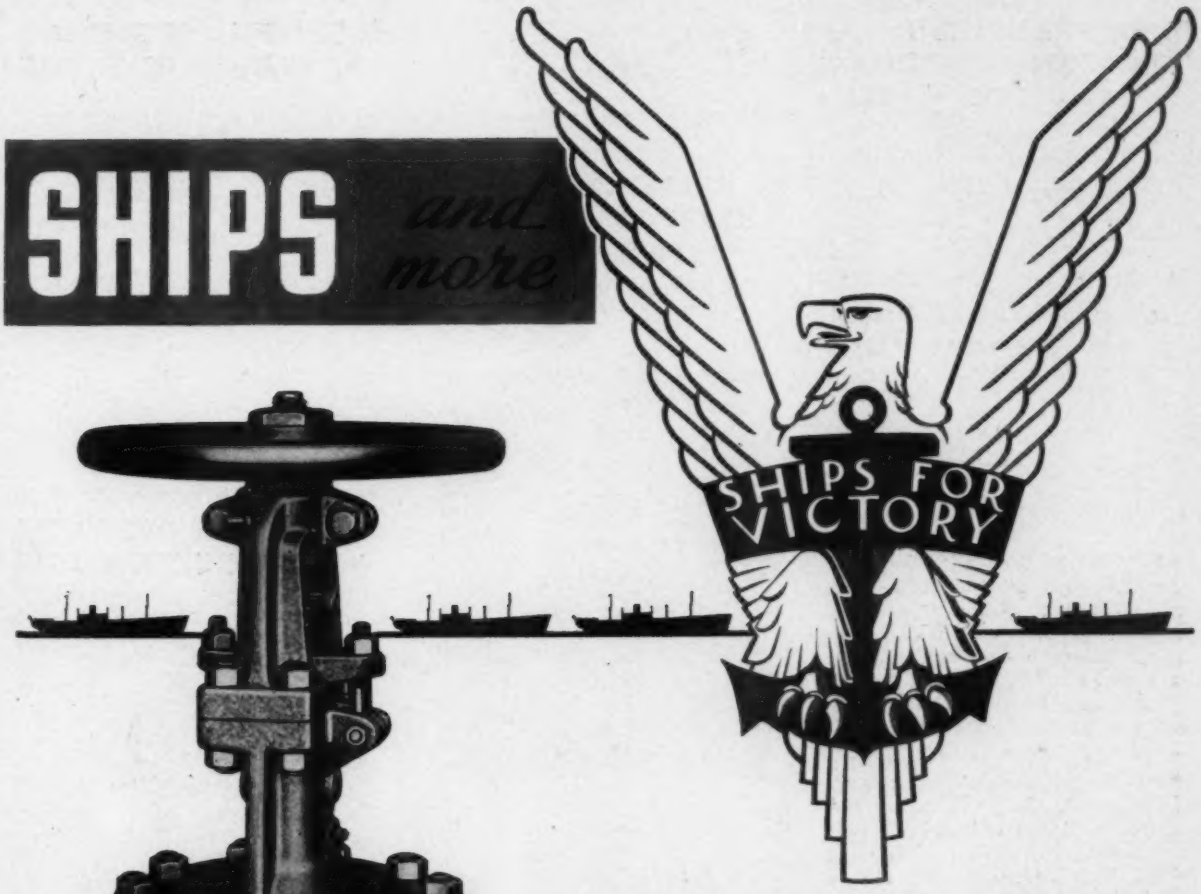


Fig. 3003—A Class 300 pound Cast Steel Gate Valve with flanged ends and outside screw rising stem. This Powell Valve, of wide application in the process industries, is especially adapted for controlling high temperature steam and for boiler feed service. Available in sizes from 1¼" to 24".



HUNDREDS of valves are needed on every ship in Uncle Sam's Victory Fleet. Thousands more are required by Industrial America to produce the equipment and supplies for outfitting these ships. Many of these will be POWELL Valves—some especially designed for specific purposes, others standard. So many Powell Valves, in fact, that our plants are working 'round the clock seven days a week to supply this demand.

We are proud of the confidence that the Navy, the Maritime Commission, Engineers, Architects and American Manufacturers are showing in POWELL Valves. We are proud of our participation in the creation of the New Victory Fleet, and of our part in the production of more power, chemicals and all the other essentials for Victory. We are happy to contribute to the service of Our Country the engineering and manufacturing facilities we have built up over a period of almost a century.

The Wm. Powell Company
Cincinnati, Ohio

POWELL VALVES

BETZ TRANSFERS FEDDERN TO STUDY COOLING WATER

Edward C. Feddern has been transferred from the General Laboratories of W. H. and L. D. Betz, Philadelphia, Pennsylvania, to the Department of Research, where he will devote the major portion of his time to the study of scale prevention and sludge fluidity in connection with cooling waters.

Mr. Feddern is a graduate of Drexel Institute of Technology and has served as water chemist with the Betz Laboratories for the past eight years. The results of his new studies will be of particular interest to those war plants whose increased production schedules demand greater efficiency in their cooling water systems.

◆

▶▶▶ After 30 years with the Kimberly-Clark Corporation, Neenah, Wisconsin, *John S. Sensenbrenner* has announced his resignation as vice president, sales manager and member of the executive committee. He will continue with the corporation as a member of the board of directors.

◆

▶▶▶ Changes in directing personnel of Pacific Mills, Ltd., Ocean Falls and Vancouver, British Columbia, include the election to the board of directors of *Eric W. Hamber,* who will replace *Frank N. Youngman,* of Portland, Oregon. *Louis Bloch,* of San Francisco, has retired as chairman of the board, while *Albert Bankus* and Mr. Youngman have retired as vice presidents. *A. B. Martin* continues as president of the company, with *John A. Young,* vice president and treasurer; *H. C. Pim,* vice president; and *J. H. Lawson,* secretary.

◆

▶▶▶ Advertising manager of the Kalamazoo Vegetable Parchment Company, Parchment, Michigan, *Glenn Stewart* has been appointed director of the Kalamazoo County Victory Speakers Bureau, affiliated with the Kalamazoo County Defense Council. The Bureau will arrange for the presentation of speakers on the many phases of civilian defense.

◆

▶▶▶ The sales and service organization of Wheelco Instruments Company, Chicago, has announced three appointments. *C. L. Clark,* associated with Westinghouse Electric & Manufacturing Company for the past 13 years, has joined the Cleveland office as sales engineer; *Robert N. Miller,* sales and service engineer for Mercoid Corporation in Chicago for the past 7 years, is now service engineer with the Cleveland office; and *Howard B. Jones,* formerly with McGraw-Hill Publishing Company has been employed as sales and service engineer at the Chicago office.

◆

R. E. EMERY HAS BEEN 42 YEARS IN "STEEL" BUSINESS

President of the Jessop Steel Company, Washington, Pennsylvania, R. Edson Emery is celebrating his 42nd anniversary of service in the steel industry.

R. E. Emery

Mr. Emery began his career in 1900 with the Crucible Steel Company, serving in many capacities. He was made general superintendent of all works in 1922, when he left Crucible to become president of Superior Steel Company. In 1927, he became vice president of the Colonial Steel Company, and since 1929, he has been president of Jessop.

◆

▶▶▶ Joining the Royal Canadian Naval Volunteer Reserve some months ago, *Sub-Lieutenant Lantier Rolland* has been granted his commission and is now on active service. A graduate of the Paper Making School at Three Rivers, he is the son of Olivier Rolland, director of the Rolland Paper Company, Ltd., and manager of the mill at Mont Rolland.

◆

▶▶▶ The Board of Directors of Pittsburgh Piping and Equipment Company, Pittsburgh, Pennsylvania, announce the election of the following officers: *Chas. R. Rall,* chairman of the Board; *L. K. Hamilton,* president; *Karl F. Tiegel,* vice president; *Jos. G. Gardner,* secretary; *Chas. R. Rall,* treasurer; *G. S. Larsen,* chief engineer; and *F. J. Hays,* assistant treasurer.

WHITING FOREMAN SERVES 60 YEARS

Enos D. Smith, 81, has just rounded out 60 consecutive years in the employ of the Whiting Paper Company, Holyoke, Massachusetts, the only firm for which he has ever worked. During that time he has served under three generations of the Whiting family.

Mr. Smith was born in Moira, New York, in 1861 and went to Holyoke in 1882 where he began work in the loft at Whiting's No. 2 mill. He was later transferred to the rag room, of which he has been foreman for 48 years. As many as 55 employees have been under his supervision in that department.

◆

MISSIMER NOW WITH BUR. OF STANDARDS

The National Bureau of Standards has appointed J. K. Missimer as papermaker. Mr. Missimer and M. J. O'Leary, who has served for a number of years as papermaker, will operate the semi-commercial paper-making equipment of the Bureau. This equipment is now being used extensively on work related to the War.

In Mr. Missimer's former connection with the Standard Paper Manufacturing Company of Richmond, Virginia, he gained considerable experience for his new position, as he was connected with the company's semi-commercial experimental paper mill as well as the commercial mill.

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▶▶▶ *William A. Harding* has been appointed manager of sheet, plate and specialties of the Jessop Steel Company, Washington, Pennsylvania. Mr. Harding studied metallurgy at the Polytechnic Institute of Brooklyn, and had been associated with Crucible Steel Company for the past 20 years.

Necrology

MARTIN L. GRIFFIN

Martin Luther Griffin, a retired consulting chemist in the industry, passed away at his home in Taunton, Massachusetts, on August 28.

Mr. Griffin was born in Northampton, Massachusetts. He received his master's degree at Amherst College in 1886, after which he established a paper laboratory in Holyoke, Massachusetts, becoming one of the first to

study the chemistry problems of the wood pulp industry. Later he was employed by the West Virginia Pulp and Paper Company, the Oxford Paper Company, Rumford, Maine, and the Champion Paper and Fibre Company of Canton, North Carolina. In 1919, he went to the Mt. Hope Finishing Company at North Dighton, Massachusetts, as chief chemist.

Mr. Griffin was a member of the American Chemical Society, the Society of Chemical Industry (London), the American Society of Textile Chemists and Colorists, and the American Mining and Metallurgical Engineers.

He was 83 years old and is survived by his widow and two sons.

◆

▶▶▶ Former engineer and superintendent of the Bear River Pulp & Paper Company, Bear River, Nova Scotia, for many years, *J. Howard Cunningham* passed away on July 25 at the age of 61. Mr. Cunningham was graduated from Acadia University, Wolfville, Nova Scotia, and then studied in Germany for about three years. Upon his return to Canada, he was employed in western Canada, later at Sydney, Nova Scotia, and then joined Bear River as an engineer. He is survived by his widow.

◆

E. O. HEMSTREET

Edward Orlan Hemstreet, sales engineer of The Carborundum Company, Niagara Falls, New York, passed away at his home in Stamford, Ontario, on August 7.

Mr. Hemstreet was born at West Aylmer, Ontario, in 1901. He joined Carborundum in 1924, and after a period of training, he was sent to a Canadian territory, covering the hardware trade. Later he made his headquarters at Montreal and was the Carborundum sales representative there, selling grinding wheels and coated abrasive products to the industrial trade. In 1933, he began an intensive study of pulp grinding and pulp grinding wheels and was appointed as sales engineer specializing in this work.

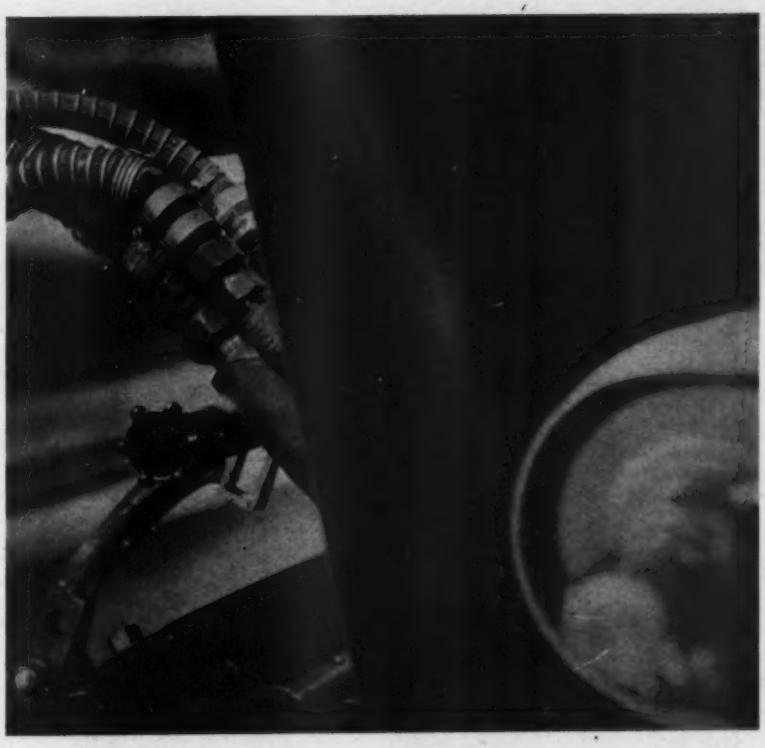
Surviving are his widow and a son.

◆

FRANCIS J. AREND

Founder and president of the De Laval Steam Turbine Company, Trenton, New Jersey, Francis J. Arend passed away on August 24, in Neptune, New Jersey.

Mr. Arend also was president of the De Laval Separator Company, which has grown from a very small beginning to a nation-wide organization during his association with it.



Felt Cleaners are only part of the picture of economical, satisfactory pressing of paper. Modern designing of felts makes it easier to keep felts clean and porous.

A Draper representative, thoroughly posted on the theory and practice of felt designing will be glad to discuss your problems with you.

This service costs you nothing, but may profit you much. Let us know when to send a Draper man.

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Maintenance and Conservation Forum

Conservation of Chemicals

(Compiled by Conservation of Chemicals Committee. Chairman—Ralph W. Kumler, American Cyanamid & Chemical Co.)

Fortunately, few chemicals used by the paper and pulp industry are critically short. On the other hand the shipment of chemicals ordinarily packaged in metal containers may soon become a serious problem. It is therefore necessary that every effort be made to conserve the supply of such containers by

(1) Careful handling.

(2) Using non metal containers whenever possible.

(3) Avoiding the accumulation of either loaded or empty containers in storage.

Below is given a series of suggestions for the care of containers:

METAL CONTAINER CONSERVATION

Handle filled and empty metal containers carefully to avoid damage.

Return empty containers to chemical supplier as promptly as possible.

Use paper bags, plywood or fiber containers whenever possible.

Store metal containers indoors at places where corrosion or damage is least likely to occur.

See that bungs, lids, gaskets, and other accessory parts of containers are not lost but returned to chemical supplier.

Schedule tank car shipments so that cars may be unloaded and returned promptly.

If drums must be stored in the open lay on sides so water will not collect on heads and store on dunnage to avoid contact with wet ground.

Keep drum tightly closed to prevent internal corrosion.

In connection with the substitution of other materials for metals considerable work has already been done on the adaptation of fiber and plywood drums and paper bags to the packaging of chemicals.

The alkali chlorine industry is now actively engaged in a survey to determine the suitability of non-metallic containers for such materials as flake and ground caustic soda, chloride of lime, and possibly hi-test calcium hypochlorite. It is realized that nothing much can be done without a non-metallic container substitute for the drum which carried solid caustic soda. In view of the critical steel situation, however, information has come to us from WPB that the subject of non-metallic containers should be thoroughly studied and preparations made to switch over on exceedingly short notice.

Of no less importance than drums are tank cars. The necessity of care of tank cars in order that as much material as possible for the repair of tank cars can be spared for the war effort even though there is no prospect that repairs will become inobtainable.

Five concrete suggestions for the care of chlorine tank cars are as follows:

CHLORINE TANK CAR CARE

The major factor in keeping chlorine tank car equipment in good order is elimination of moisture. Do not allow water or foreign material to back up from the processing system into the car. Whether vacuum relief units are in use or whether the mill depends upon positive tank car pressure, see that the tank car is protected.

See that chlorine lines leading to the tank car are closed to the atmosphere. Pipe caps, plugs, or blank flanges should be fitted to open ends immediately. The plugs which are attached to the tank car angular valves should be inserted immediately whenever the piping to the tank car is removed. This precaution keeps the car dry and protects the valves.

Any leakage at the valves should be stopped. Chlorine and atmospheric moisture destroy steel parts. If the valve leaks at the base tighten the packing reasonably and with caution to stop this leakage.

Keep the dome cover closed. The dome cover protects valves and helps keep the car clean.

Turn cars back into service as promptly as possible. The tonnage of chlorine shipped per tank car is important and the more quickly cars are placed back in service the more chlorine can be delivered.

CHLORINE CONSERVATION

Of chemicals themselves of which there is a shortage, chlorine is the most important. The waste of chlorine may cause corrosion of equipment and that waste may be due to inexperience in its use. There is a distinction between "luxury" and essential uses.

Wash bleach liquor sludge thoroughly to reduce chlorine loss.

Cook pulp as drastically as possible to render bleaching easy.

Wash pulp thoroughly prior to bleaching, between stages, and after bleaching.

Keep *p*H of bleach liquor in storage and that of pulp being bleached above 9.0 with ample supply of free lime.

Use sodium metasilicate with bleach liquor.

Blend bleached and unbleached pulps for intermediate shades.

In multiple stage bleaching use minimum ratio of chlorine in chlorination stage to chlorine in hypochlorite stage.

Do not overchlorinate.

Do not overheat pulp being bleached.

Avoid excessive residual bleach or chlorine.

Avoid contact of catalytic metals such as bronze, brass, copper, nickel, etc., with bleach liquor.

Modifications in the preparation of the unbleached pulps.

Cook more drastically so as to reduce the chlorine demand.—This has been applied already in many cases as a means to meet previous chlorine restrictions but it may still have value. Chlorine savings by this method may be obtained in some cases only at the expense of reductions in yield and in modifications in the quality of the product. Most mills need no reminder of this method.

Wash the unbleached pulp more thoroughly.—It is probable that many mills, regardless of pulp grade, could show some chlorine reduction by a better washing of the unbleached pulp. The method may not present an economic appeal but is of interest under present circumstances.

Improve efficiency of bleach liquor making.

Improve washing of sludge.—The sludge loss of chlorine should not exceed 3 per cent.

Use unsettled liquor and eliminate all sludge losses of chlorine.—A change-over from settled to unsettled bleach liquor will involve some cost for equipment and possibly some change in procedure in measuring out batches. Even though a change-over is not justifiable under normal circumstances it may definitely be so in the Emergency situation. The saving in chlorine may be 3 per cent, or more if the operation has been inefficient.

Avoid overchlorination, otherwise loss of chlorine may occur.

Keep liquor saturated with free lime at all times. This will favor stability of the liquor during storage.

Avoid catalytic metals such as bronze, brass, copper, nickel, etc., in contact with the liquor. (These metals promote the decomposition of the liquors with the evolution of oxygen.) Especially avoid combinations of metals in the liquor handling system. Iron and iron rust also act as catalysts, but in operation are soon covered over with a protective coating of lime scale.

Avoid high temperatures in the liquor—Liquor containing 30 to 35 gpl, available Cl_2 should not exceed 95 Fahr. At 15 to 20 gpl, available Cl_2 the temperature may be raised to 105 Fahr.

Hypochlorite bleaching.

Avoid excessive residuals of available chlorine at the end of the bleaching period. A trace is desirable but more is a waste of Cl_2.

Control of *p*H during bleaching—The

This is the third and last installment of the Maintenance and Conservation data presented at the annual meeting of **The American Pulp and Paper Mill Superintendents Association,** Grand Rapids, Michigan, June 16-18, 1942. (See Page 386 of the July issue for panel personnel.)

TITANOX
Take Over
THE benefits of TITANOX pigments now are more important than ever before as conservation of pulp and bleaching agents puts a premium on opacity, whiteness, brightness and satisfactory printing surfaces in lighter weight stocks. Use more TITANOX.
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Recondition for Salvage and Wartime Maintenance!

MAGNUS TECHNICAL BULLETIN
No. 74
REPAIR, MAINTENANCE and CONSERVATION of PAPER MILL EQUIPMENT
MAGNUS CHEMICAL COMPANY Garwood, N. J.

More than ever, it's up to the paper mill to set up carefully planned programs for cleaning and reconditioning because of shortages of critical metals and other materials. Pipe and piping, machine parts and accessories, felts and every other possible working or laid-up equipment in the mill should be cleaned either for salvage, future repairs or replacements—or for better maintenance and high-speed production.

MAGNUS CLEANERS FOR RECONDITIONING

together with suggested methods of use adapted to these times of war are covered in great detail in this new technical bulletin No. 74.

You will find the data it contains to be practical and immediately useful. Cleaning and reconditioning of pipe and piping; machines of all kinds; suction press rolls; felts; fuel oil storage tanks and systems and all other mill equipment are covered in detail.

Write now for your copy.

THIS BULLETIN IS FULL OF PRACTICAL IDEAS THAT CAN SAVE YOU PLENTY AND AVOID PRODUCTION DELAYS.

MAGNUS CHEMICAL COMPANY
Manufacturers of Cleaning Materials, Industrial Soaps, Metallic Soaps, Sulfonated Oils, Emulsifying Agents and Metal Working Lubricants.
192 South Avenue Garwood, N. J.

MAGNUS CLEANERS

free alkali in the bleach liquor is usually insufficient to keep the batch of pulp alkaline, i.e. at *p*H greater than 7 to 7.5, throughout the bleaching period. At low *p*H more chlorine may react to chlorinate lignin which is not an efficient reaction for low brightness pulps. At low *p*H, too, especially if metal catalysts are present, some of the bleach may be converted to inactive oxygen and so become ineffective.

Lime or caustic soda should be added to the pulp to prevent excessive drops in *p*H. It may be added all at the beginning of the bleaching period, or, in 2 or more portions at intervals during the period. The hydrated lime (or caustic soda) usually required may vary from 0.15 lb. to 0.3 lb. per lb. of available chlorine in the bleach liquor used.

Maintain high *p*H during bleaching—If the *p*H is not allowed to fall below 9 to 9.5 the rate of bleaching is reduced. Longer bleaching periods are required, or, higher temperatures are needed to keep the bleaching period at its normal length. In some cases temperatures of 125 Fahr. are reported.

When the brightness standard is reduced the normal bleaching period may be shortened. In such case it may be possible to maintain high *p*H and normal production without the use of higher than normal temperatures.

The high *p*H is reported, in some cases of bleaching, to have resulted in a chlorine saving of 10 per cent over the consumption under normal *p*H control.

Use of sodium metasilicate along with the bleach liquor.—There are some indications that the use of not over 10 lb. solid sodium metasilicate per ton pulp results in a saving, at times, of 15 per cent in the chlorine consumption and that the saving is not attributable to *p*H control. We have had, as yet, no actual experience with the use of this chemical.

Reduce the proportion of chlorine used in the chlorination stage of present multi-stage procedures.

To maintain maximum strength of high brightness it is necessary to force the chlorination. When the brightness standard is lowered this forcing is not necessary and greater economy of chlorine consumption can be obtained by reducing the proportion of chlorine added in the chlorination stage, perhaps even to 30 or 40 per cent of the total for all stages.

There is another reason for reducing the proportion of chlorine used in the chlorination stage when bleaching to lower than full bleached brightness. The proportion of chlorine used in the hypochlorite stage must be kept relatively high, especially for sulphite pulps, so as to keep the dirt content of the bleached pulp at a minimum.

More thorough washing of the pulp at various points in the bleaching procedure.

The more thorough removal of impurities from the bleached pulp the brighter the pulp is likely to be and the greater will be the stability of the brightness. Hence, the chlorine required for any given brightness should be reduced by thorough washing.

Likewise the more thorough the removal of impurities from the partially bleached pulps the less chlorine will be required to bring them to the full bleached standard.

Blend unbleached with bleached pulps for intermediate shades.

For brightness above 75 it is probably more economical of chlorine to bleach all the pulp to the desired brightness than to blend unbleached with fully bleached pulp. For lower shades there is some evidence that greater economy of chlorine can be obtained by blending some unbleached with a pulp bleached to a lighter shade, e.g. in one case the following data were obtained experimentally:

	Brightness
Unbleached hemlock	50.4
Bleached with 4% Cl_2	59.5
Blend (average 4% Cl_2)	63.1

1 part unbleached at 50.4 brightness.

2 parts bleached with 6% Cl_2 at 75.1 brightness.

The practical applicability of this suggestion will depend on many conditions such as brightness of the unbleached, brightness desired, etc., all of which will have to be studied locally at each mill.

Dyestuffs

(Compiled by Conservation of Dyestuffs Committee. Chairman—S. S. Harkavy, Geigy Co., Inc.)

It seems to us that the problem before the dyestuff manufacturers and the paper industry over the next year will be one of adapting their formulæ to utilize those dyestuffs whose materials are not urgently needed for war purposes.

We feel that some dyestuffs will be short or difficult to obtain due to the raw materials being diverted to essential war uses, but there are many dyestuffs of more or less similar shades and properties that are available to take the place of those that are critically affected.

We feel on the whole, that there will be sufficient dyestuffs on hand to take care of normal mill requirements.

Metals Conservation and Maintenance

(Compiled by Metals Conservation Committee. Chairman—R. T. Barnes, Jr., Development & Research Division, The International Nickel Co., Inc.)

Since the use of metals and alloys by the pulp and paper industry is now restricted by mandatory priority regulations, it is imperative that the plant engineer and maintenance man stress the application of the following practices intended to maintain and conserve existing metal process equipment, and in particular that equipment fabricated of the strategic and critical nonferrous metals and stainless steels.

CLEANING AND SOURING

The recommended cleaning and souring practices for the several non-ferrous metals and stainless steels differ in many respects and the same practices are not recommended for all materials. Before setting up standard cleaning methods for any one equipment item, make certain that the identity of the metal from which it is made is known to you.

The acids, alkalies and solutions prescribed for cleaning and souring should be used only in the proper concentrations and at the specified temperatures. Any changes

CLOTHING... *for the* Selective Service

THE MEN in our fighting forces must be properly clothed for the work they have to do. Their garments and blankets must be of the best wools, properly blended and correctly woven. They must stand up under the hardest service, long continued. They must keep the men warm and *dry*.

Your paper machines, too, are in the selective service for the duration of the war. Because they must do soldiers' work they must be clothed as soldiers are clothed. To assure this the Government has allocated unlimited quantities of wool to the manufacturers of paper mill Felts as they have allocated to the makers of blankets and clothing for the Army and Navy.

Equip your machines with Hamilton Felts. They will not only "stand up" longer under war time stresses but they will deliver dryer sheets to your rolls.

FROM THE THINNEST TISSUE TO THE HEAVIEST BOARD THERE IS A HAMILTON FELT THAT WILL DO YOUR WORK BETTER, FASTER AND AT LOWER COST.

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Send in your necessary orders at once, carefully noting END USE SYMBOLS on your order form. If you have any doubts or questions as to procedure write us and we will supply full information and instructions by return mail.

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from these limitations may result in the promotion of needless corrosion of the metal or alloy.

When long shut-downs for repair or other purposes are anticipated, remove all pulp deposits from screens, washers, rolls and other metal equipment. Never use steel wool for cleaning deposits from non-ferrous metals or stainless steels.

Copper and Copper Alloys—Use cold dilute (not over 10 per cent) *sulphuric* acid to clean copper and copper alloys. Never clean or sour copper and copper alloys with *nitric* acid or *chlorine* solutions.

Monel—Use cold dilute (not over 10 per cent) *sulphuric* or cold dilute (not over 5 per cent) *hydrochloric* acid to clean and sour Monel. Never use *nitric* acid or *chlorine* to clean and sour Monel equipment.

Stainless Steels—Use dilute *nitric* acid to clean stainless steel. Make certain the nitric acid so used does not contact other parts of the equipment which may not be of stainless steel. Never use *hydrochloric* (muriatic) or *chlorine* solutions for cleaning stainless steel. Whenever possible, allow the stainless steel to dry thoroughly in the atmosphere after cleaning, since this practice is desirable to assure repassivation of the stainless surface.

Flushing and Rinsing—Flush directly with cold fresh water after every cleaning and souring. Never use steam directly on metal equipment immediately after the application of the cleaning or souring solution. If the use of steam is believed necessary, make certain that a flushing with fresh water precedes the application of steam.

COMBINATION OF DISSIMILAR METALS

Make certain that when dissimilar metals are used together in one piece of equipment they form safe galvanic combinations. Never combine large areas of the relatively noble Monel, stainless steels and copper alloys with smaller areas of mild steel, galvanized steel or cast iron.

Check carefully that any substitute metal which must be used has adequate even though lessened resistance to corrosion than the metal it replaces.

Never weld non-ferrous alloys or stainless steels with rods other than those specifically recommended for them.

PROPER EQUIPMENT DESIGN

Pulp and paper mill equipment designed for operation with corrosive solutions should be so fabricated that no crevices, open seams or restricted areas away from free flow of fresh solution are present. When such areas do occur, they invite concentration cell or crevice corrosion, which quite likely will cause metal failure at the exposed point, by breakage in the case of wires, or by pitting and perforation in sheet metal construction.

When metal tie-rods, bolts and screws are used to support and join together wooden tanks, those ends of the rod or metal accessory which will contact wet wood should be protected against corrosion by the stagnant solutions with one or more coats of acid-resisting paint.

The use of excessively high liquid velocities or the impingement of high-velocity liquids or high-pressure steam on localized areas should be avoided since these affect to a serious degree the corrosion and wear of metal equipment.

HANDLING CLEANING EQUIPMENT

The preparation and dilution of cleaning solutions and water-treating chemicals should take place outside the operating equipment. Cleaning solutions should be added to, or used on, operating equipment only in the properly diluted concentrations and at the correct temperatures, and mixing and dilution should take place outside the operating equipment. In the case of bleach solutions prepared from chlorine, these should be made up in equipment especially designed for the purpose.

The preparation and dilution of alum solutions is a corrosive operation and should take place preferably in non-metallics. The prepared alum solutions are highly corrosive when pumped at high velocities, so if alum pipe line corrosion has been troublesome, the substitution of larger pipe or reduction of solution velocity will be advantageous.

Lubrication

(Compiled by The Lubrication Committee. Chairman—T. E. Dial, Socony-Vacuum Oil Company, Inc.)

In any industry operating a large quantity of machinery such as is required in the manufacture and finishing of paper, it is important that full consideration be given to all factors affecting maintenance costs and

These are days when paper mill operators appreciate Buffalo dependability more than ever! Breakdowns and delays are doubly expensive — Buffalo Full Ball-Bearing Pumps are insurance against stalled production.

Designed with special impellers that can't clog, and super-built to resist the sudden jolts of stock consistency changes, Buffalo Paper Stock Pumps are keeping on the job continuously and efficiently, moving stock on schedule.

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SELF-LUBRICATING PACKINGS

conservation of materials, especially metal products.

Paper mill maintenance costs directly include such items as wires, felts, babbitt and bearings, oil, repair labor, and, indirectly, the wear or loss of other parts due to worn bearings or misaligned shafts. Most of this cost can be charged primarily to friction in some form or other; therefore, if we direct our attention to the elimination of friction, wherever possible, we go a long way toward solving our problem relating to maintenance and conservation.

We offer for your consideration a study of the correct lubrication of paper mill machinery, and its effect upon items of cost, such as wires and felts, and the quality, as well as the quantity, of the paper manufactured.

Every moving part of the machinery in a paper mill turns or slides on bearings of some kind; therefore, bearings are important and warrant the expenditure of time, money and thought to assure that each one is mechanically in the best condition for its particular task and that it is supplied with a lubricant suited to its requirements.

If this procedure is followed, we can expect:

First—minimum labor needed for rebabbitting, releasing trained mechanics for other important work. In one large mill three men were thus released from what previously had been a steady job of babbitting and reconditioning of bearings.

Second—minimum consumption of babbitt. In the mill just mentioned, the drop in babbitt consumption totaled better than 2,000 pounds a year.

Third—minimum time lost due to enforced shut-down, and minimum disruption of machine operation due to misadjustment or poor control.

It is more difficult to keep a machine in adjustment when bearings heat, wear, chatter or seize. For instance, table rolls worn flat sided because of temporary bearings seizure thereafter interfere with uniform web formation on the fourdrinier wire. Dragging dryers and presses increase the difficulty of synchronizing the various sections of a paper machine, and so tend to promote breakage of the sheet. Hot calender bearings cause thermal expansion of the steel rolls and result in soft nosed rolls of paper on the reel.

Fourth—prevention of damage to other machine parts caused by bearing failure.

For instance, gear tooth wear, and in extreme cases, tooth breakage, can be charged directly to worn bearings and misaligned shafts.

Necks of press rolls, dryer rolls, calender rolls, beater rolls, etc., may be scored or otherwise damaged as a result of bearing failures.

The life of fourdrinier wires is shortened when table rolls or wire rolls drag or stick in their bearings.

The life of press felts on a cylinder machine is shortened when baby press rolls cease to turn freely in their bearings.

SUPERVISION OF LUBRICATION

It is widely recognized by executives of paper mills that the quality of a lubricant and its proper selection for the service play important parts in the efficient lubrication of paper mill machinery; however, few realize the importance of supervision in the lubrication of this equipment.

The supervision of lubrication in most mills usually comes under the jurisdiction of a head oiler who is charged with the direction of the various oilers, oil storage, distribution, reclamation, and oil consumption records.

To fulfill this job properly he must:

First—keep the bearings running and the machines producing.

Second—protect bearings and keep maintenance at a minimum.

Third—conserve lubricants and reduce oil costs.

Fourth—keep an accurate record of oil consumption, preferably by departments.

The first three aims, however, are not always compatible one with the other.

For example, a hot bearing may continue to run and to produce paper but at the expense of oil and final total destruction of the bearing. A short shut-down for adjustment, while interrupting production, may save a bearing. Or, certain mechanical adjustments may involve slight changes in production control but may greatly extend the useful life of mechanical equipment.

These conflicting factors require knowledge and appreciation of both the mechanical and the operating side of paper making; therefore, the head oiler should be a trained man with both mechanical and operating knowledge.

In these times when war priorities make it difficult to conveniently and quickly re-

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No other hand trucks combine simplicity of handling with speed necessary for handling as do the Skid-Em-On trucks. Reports from paper mill users throughout the United States and Canada testify to this fact.

There's nothing complicated about Skid-Em-Ons . . . no fancy gadgets or complex mechanism. A roll is rolled onto the truck, nestled gently into a specially-designed cradle and rolled off easily and without effort. Economy, that's the best thing about Skid-Em-Ons. *One man* can handle all operations connected with this truck . . . loading, carting and unloading! Interested? Just drop us a line . . . we'll be glad to supply you with full information.

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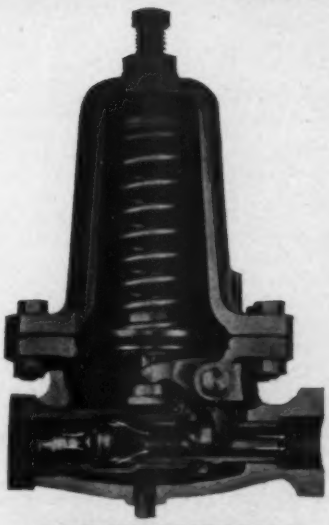

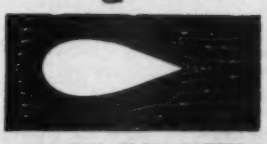

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The Streamlined form of the inner valve eliminates turbulence. It produces the flow pattern shown above which makes for maximum capacity when it is needed most, and permits accurate pressure control under toughest working conditions.

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"The particular Streamlined Pressure Regulator you refer to is installed on a paper machine making tissue paper. Pressure fluctuations are not desirable. In fact, to maintain a good, uniform quality of paper, and to get the utmost out of the machine in the way of production, sensitive pressure control is of prime importance. And because the machine runs 24 hours a day, dependability is equally important. Your valve has never missed a trick. Our operating department is well pleased." —Case No. 340.

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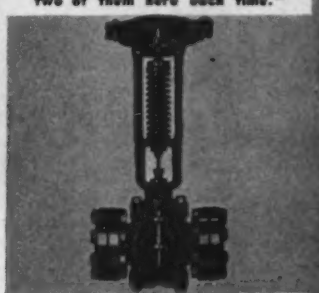
Question: "Don't you people make anything besides that Streamlined Valve you talk about so much?"

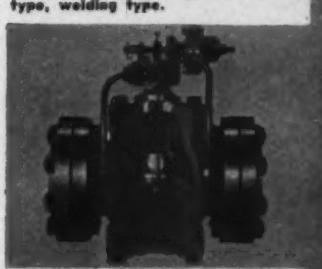
Answer: "Yes Sir; we do! And we propose to picture one or two of them here each time."



Cash Standard Type 34 Pressure Reducing Valve. For practically all fluids. Sizes: ½" to 12" inclusive. Highest initial pressure 800 lbs.; reduced pressure, vacuum to 150 lbs.

The best that money can buy in this type valve. Precision built; every mechanical detail right as can be. Long time service. Has roller guides, roller bearing — no lost motion; a change in the pressure under control produces corrective valve movement.

Bodies: iron, bronze, steel. Trims: iron, bronze, stainless steel, monel metal. Ends: screwed, flanged, ammonia type, welding type.



Cash Standard Type 10 Pressure Reducing and Regulating Valve — self-contained, pilot operated. For holding reduced pressure within extremely close limits.

Sizes: 2" to 12" inclusive. Highest initial pressure 600 lbs.; highest reduced pressure 250 lbs. For use with water, air, Freon, ammonia; or with any non-corrosive gas or oil. Valve operating fluid not wasted; it discharges to outlet pipe.

Bodies: iron, bronze, steel. Trims: iron, bronze, stainless steel, or monel metal. Ends: screwed, flanged, ammonia type.

A dial on the pilot valve makes it easy to widen or narrow the control pressure range until you establish the ideal range for your service.

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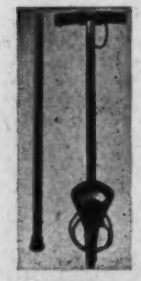
IT'S DUCK SOUP TO PREVENT COCKLE, CURL and BLISTERS

The Cambridge Surface Pyrometer is helping paper makers to maintain quality standards, today. We suggest its routine use for checking surface temperatures in the drier section. Proper progressive temperatures here will go a long way in preventing spots, cockle, curl and blisters.



Write for Bulletin 1945

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CAMBRIDGE
SURFACE PYROMETERS

place broken or damaged machinery, this matter of machine protection assumes great importance.

The degree of success which the head oiler attains on this job depends to a great extent upon his ability to guide and direct the men under him. It also depends considerably on the machinery with which he has to work. Success depends a lot on the mechanical condition of the bearings and the condition under which each operates. By mechanical conditions, we visualize such things as incorrect bearing clearances, sharp edged shells, incorrect grooving, missing or loose caps, missing or broken oil cups, bent oil rings, fouled reservoirs, plugged oilways, leaking seals, tight belts, misalignment, etc.

To supervise properly these mechanical conditions for all the different types of bearings in the average paper mill requires that the head oiler be able quickly to recognize difficulties and misadjustments—in other words, that he be a competent mechanic. Too often this job is filled by a man who sees only the oil pouring side of the problem, not appreciating the mechanical defects until they finally develop into serious trouble.

A good head oiler prevents trouble before it occurs instead of trying to catch up after it has happened. Lubrication in many mills, particularly of the machine room, is under the jurisdiction of the paper mill superintendent, and, in some cases, under the machine tenders. Lubrication and prevention of trouble are mechanical jobs and the correction of trouble is also a mechanical job. The best results are attained when the head oiler is a member of the maintenance crew and is responsible to the master mechanic.

In these days, replacement machine parts are sometimes difficult to secure and damage to machinery may involve extended shut-downs and serious loss of operating time. Any ideas that aid in protecting the present equipment are worthy of serious consideration and we feel that in many mills the job of head oiler can be revamped to improve definitely the service secured from machine parts.

GROOVING OF PLAIN BEARINGS

In paper mills, plain bearings still exist by the thousands. In fact, when a bearing runs hot, almost invariably it is a plain bearing. Very often the heat is due to failure of the lubricant to reach the area of maximum bearing pressure in quantities sufficient to form a separating oil film. There may be excess oil available in parts of a bearing but not at the working surfaces where it is really needed.

As long as the oil film completely separates journal and bearing, there can be no metal to metal contact, no metallic friction, no heating and no wear—hence, low maintenance costs. This is the ideal at which all lubrication should aim—particularly at the present time when war priorities make it necessary to secure the greatest possible operating life from every pound of tin and antimony in our bearing metals.

Where full fluid films are not maintained there is bound to be more or less metallic contact. Oil may be present but not in sufficient quantities completely to prevent friction in such bearings. Where this condition exists, the character of the bearing metal plays an important part in the service rendered. Most of these bearing metals contain either tin or lead.

For the duration of the war tin, in particular, is likely to be difficult to obtain and new bearing alloys may have to be substituted—hence, it will be increasingly necessary to provide better lubricating films.

With regard to bearing design, the manner of chamfering and grooving a bearing plays an important part in determining whether the bearing runs cool and without wear, or whether it heats, wears and eventually requires re-babbitting.

We offer safe, economical solutions to all pulp and paper mill drainage problems with our twill weave, plain weave, sewed seam, and soldered seam wires.

INTERNATIONAL WIRE WORKS
Menasha, Wisconsin

The complete distribution of a lubricating film throughout the pressure area in a bearing is an essential condition for lubrication. In many cases, however, there is not sufficient time for complete distribution and in certain instances the oil does not spread equally in both directions along the length of the bearing. The resulting deficiency of oil in the pressure area causes unnecessary wear and loss of power unless an excessive feed is supplied. Although the fluidity of lubricating oil aids materially in its distribution along the length of a bearing, the completeness of this distribution can be assisted by proper grooving in the bearing itself.

In a solid bearing, distribution is obtained by cutting a longitudinal groove at the top. This groove should extend axially from the point of oil introduction toward each end of the bearing. Both edges of the groove should be rounded to permit free entrance of the oil into the clearance and to prevent scraping the oil from the journal. To minimize leakage, this groove should stop at least ½ in. from each end of the bearing.

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But for men who build such planes, those who train to fly them—and for millions of people at home, there must be an abundance of water. To a water system the name Layne is as famed as that of Boeing to long range bombers. Layne has built thousands of water systems—the very biggest in the United States. Layne likewise builds pumps—the kind that outpump, out-last and out-perform any deep well water producing equipment in any territory—on any task.

Layne's reputation, like that of the Flying Fortress has been proven the hard way—on the field of action. Layne Wells and Pumps by the hundreds are producing millions and millions of gallons of water for manufacturers, cities, railroads and the army and navy. For late catalogs, bulletins and detail information, address

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In some bearings, where the pressure is upward, it is not possible (owing to the construction of the bearing) to introduce oil near the top. Take, for example, the top press-roll bearing of a paper machine, in which the journal pressure is upward against the cap. In such a bearing the best results are obtained by cutting a longitudinal groove just ahead of the pressure area and by introducing oil indirectly into this groove by means of a correctly designed wick feed oil cup inserted at the side.

The distribution of oil to the lubricated surfaces of a collar-thrust bearing is frequently impaired by improper introduction. As in other bearings, oil should be introduced at a point where there is no pressure (either journal pressure or thrust pressure), in other words, somewhere along the top of a horizontal thrust bearing. Usually, the mistake made is that the holes drilled through the cap feed the oil to the annular spaces enclosing the thrust collars. When oil reaches the outer circumference of these collars it is held outward by centrifugal force and consequently does not reach the thrust surfaces. In this type, oil should be introduced between the thrust collars, to the small diameter of the thrust. Centrifugal force then throws the oil outward to the thrust surfaces.

In the usual two-part bearing the only grooving required for proper oil distribution is a longitudinal chamfer on each side of the bearing. This is provided simply by beveling the edges of the cap and base to within about ½ in. of the ends of the shells. Such a chamfer collects the oil drawn downward by the rotation of the shaft and distributes it axially along the length of the bearing, thus providing a source of supply just ahead of the pressure area. The edges of these chamfers should be rounded, and the bearing surface immediately below each chamfer should be slightly scraped, in order to facilitate the entrance of oil into the narrowing wedge-shaped clearance. Care should be taken to cut back the shims or liners to correspond with the form of the chamfer. This eliminates all sharp edges that would otherwise scrape oil from the journal.

Long bearings (over 8 in. in length) may require more than one point of introduction in order to assure quick longitudinal distribution, particularly where the supply of oil is intermittent or where the feed is restricted. These points should be connected by a longitudinal distributing groove or reservoir.

For heavily loaded slow speed bearings, a groove may be cut in the lower half of the bearing just prior to the beginning of the pressure area. The purpose of such a groove is to act as a distribution reservoir to spread oil uniformly along the length of the bearing.

It is a principle of good bearing design that grooves should never be cut in the working area. Grooves should only appear outside of the area of maximum pressure. Any groove that cuts across areas of different pressures, merely allows the higher pressure oil to escape to the lower pressure end of the groove. Not only is the effectiveness of the high pressure area lost in so far as its ability to carry load is concerned,

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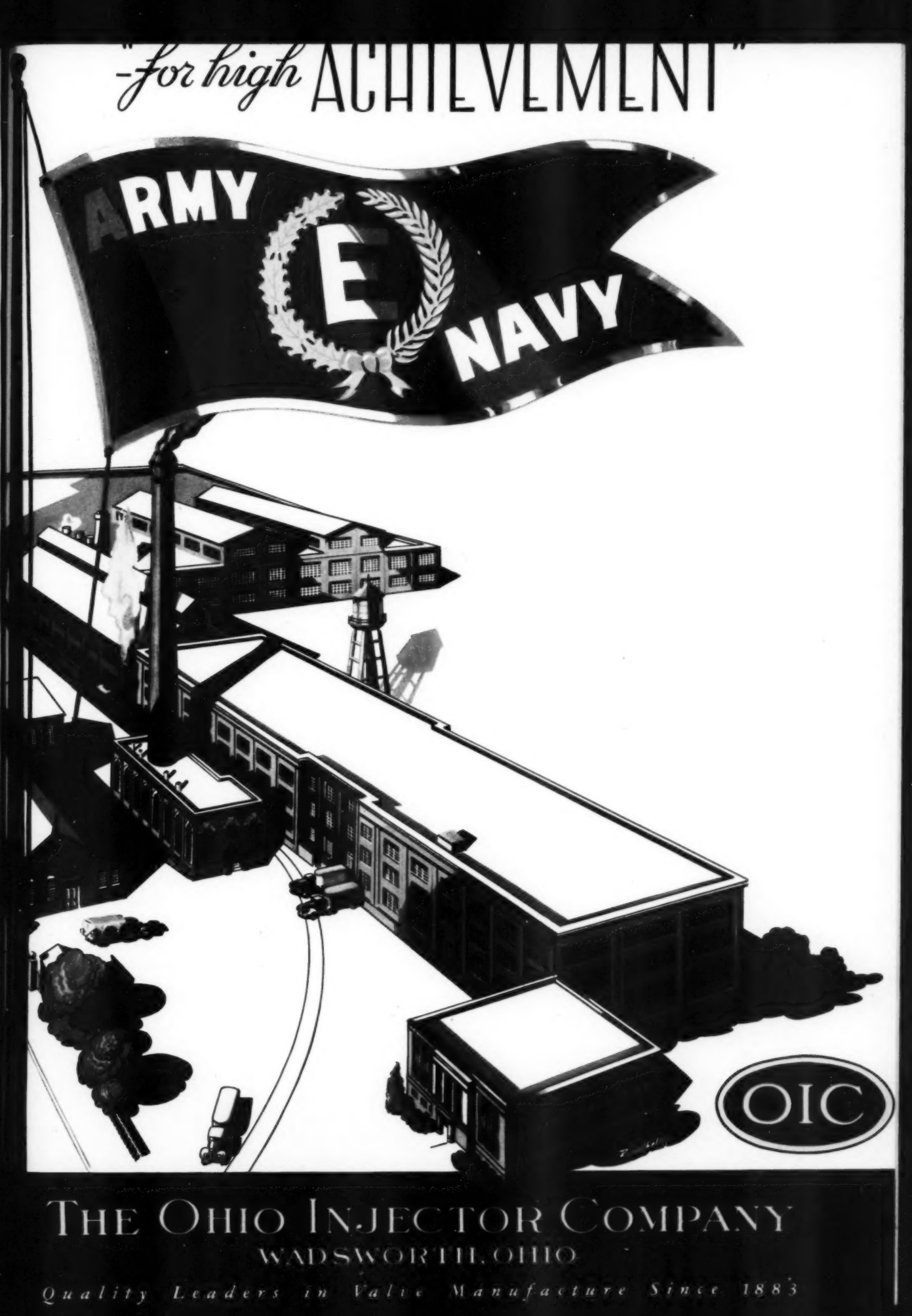
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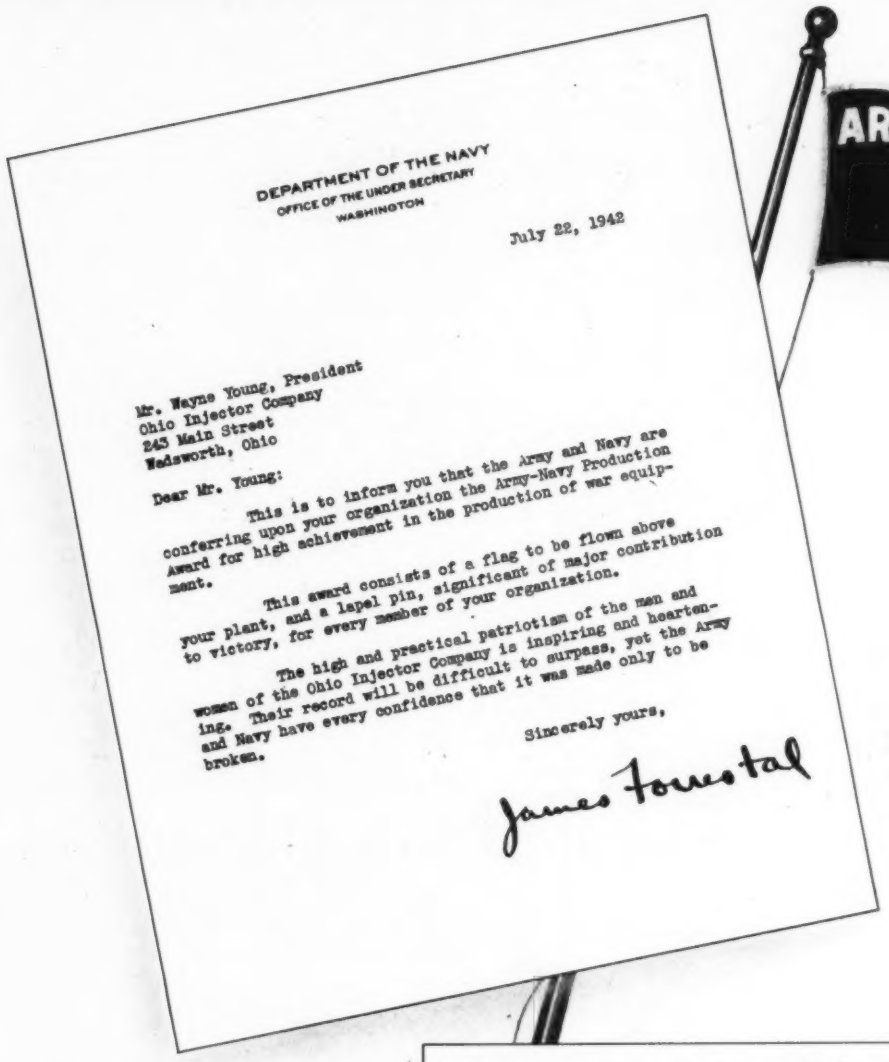

DEPARTMENT OF THE NAVY
OFFICE OF THE UNDER SECRETARY
WASHINGTON

July 22, 1942

Mr. Wayne Young, President
Ohio Injector Company
243 Main Street
Wadsworth, Ohio

Dear Mr. Young:

This is to inform you that the Army and Navy are conferring upon your organization the Army-Navy Production Award for high achievement in the production of war equipment.

This award consists of a flag to be flown above your plant, and a lapel pin, significant of major contribution to victory, for every member of your organization.

The high and practical patriotism of the men and women of the Ohio Injector Company is inspiring and heartening. Their record will be difficult to surpass, yet the Army and Navy have every confidence that it was made only to be broken.

Sincerely yours,

James Forrestal

A message to our Distributors, their OIC *Customers, and our Suppliers:*

You rightfully share with us in this Army-Navy Production Award. Thank you sincerely for your splendid co-operation.

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but the effectiveness of all of the area on the receding side is also lost.

Deep grooves with vertical sides should always be avoided because they have sharp scraping edges. Very wide and shallow grooves are also objectionable since they rob the bearing of useful pressure area. The V-shaped groove, if cut deep, may start a crack in the bearing shell; moreover, it has relatively small capacity for holding oil, and thus distributes oil poorly.

Where grooving is necessary, a shallow groove with rounded edges is most suitable. The groove should not be larger than required to accommodate the quantity of oil needed by the bearing, nor should it extend further than ½ in. from each end. A round-nose chisel provides a well-rounded bottom in the groove, and is the most suitable tool for cutting oil grooves.

BABBITTING OF PLAIN BEARINGS

In addition to the correct grooving of bearings, there are certain beneficial practices that can be followed when re-babbitting. These procedures will help greatly in extending the life of rebabbitted shells. Despite the fact that correct methods are general knowledge, there are still instances where a tightening up of babbitting procedure has resulted in material savings.

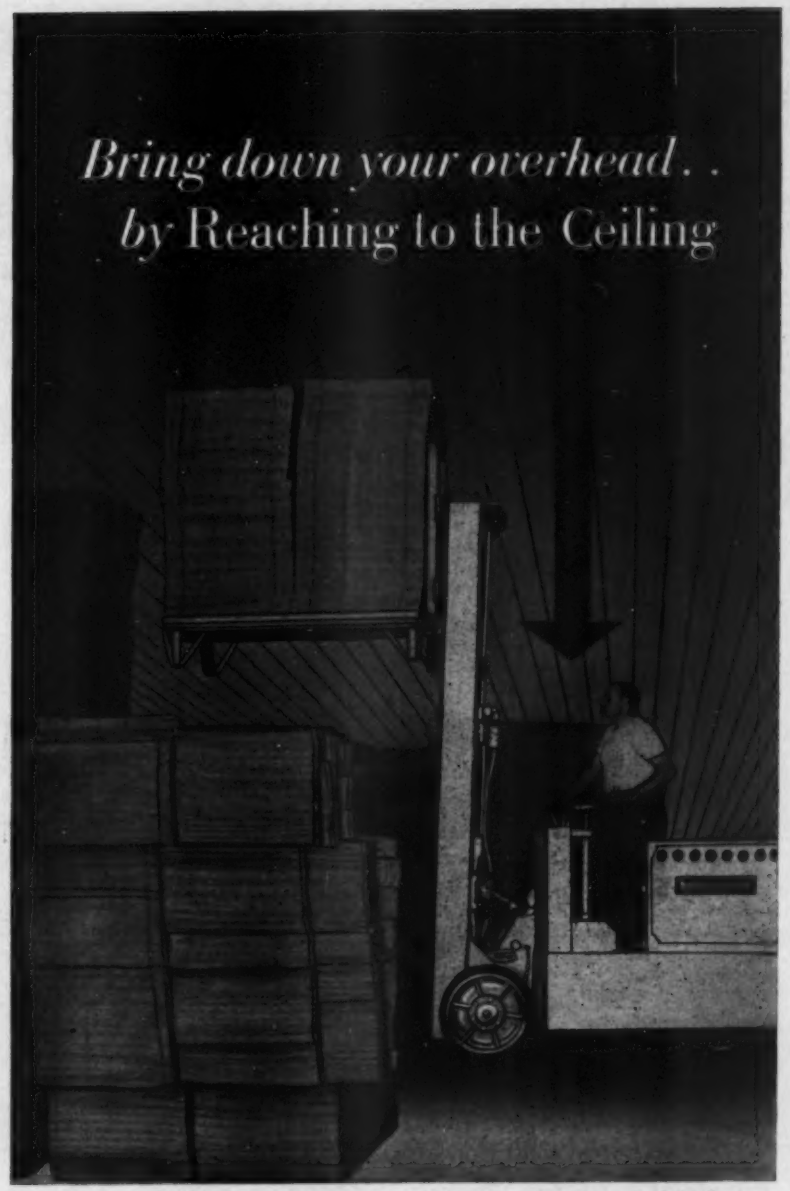
In handling bearing metals and in pouring bearings, experience is very valuable. Therefore, this work should be assigned to one or two men, thus enabling the mill to take advantage of the skill and experience that these men develop.

The first step in re-babbitting is to melt out all old bearing metal and to clean the iron surfaces thoroughly. All traces of oil, grease, carbon, dross and other dirt should be completely removed. Where absolutely necessary, bearings may be re-babbitted in place, but by far the best plan is to do this work in a place equipped for bearing maintenance. Bearings to be poured can then be set up conveniently on a work bench, aligned carefully, and rigidly supported. Mandrels of small size can be used, thus allowing ample metal for subsequent machining or scraping.

After a bearing has been re-babbitted, it is customary practice to scrape it to a uniform fit on the shaft. Best over-all results, however, are obtained by machining the bore to fit the shaft with slight clearance. When a bored bearing is put into service, it makes maximum contact along the shaft at once and quickly settles down to its permanent operating condition with a minimum amount of run-in wear.

Before pouring babbitt the bearing housing should be heated. Best results are attained if bearings are heated to slightly less than babbitt melting temperature. When this is done, a better bond between the iron housing and the bearing shell will result.

If the housing is properly heated, any moisture that may be present in reservoir or anchor holes will be driven off. Every trace of moisture should be removed before pouring the hot metal. Otherwise the sudden conversion of water into steam may throw molten metal out of the bearing or may cause blow holes in the finished cast-



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ing. It is not usually necessary to heat mandrels, but in order that the cold mandrel shall not prematurely chill the incoming babbitt, it should be insulated by wrapping with a turn or two of a smooth, tough paper.

Enough babbitt should be melted at one time to take care of the requirements of a bearing completely. Good bearings are not usually secured when babbitt is poured in installments. The quality of a babbitt bearing is definitely affected by the temperature at which the metal is poured, and to secure uniformly good results it is necessary to standardize on a uniform temperature. Judging temperature by appearance or by charred stick methods *may* give fair results, but the use of a thermometer gives better control and better bearings. Ordinary tin base babbitt usually pours well at about 700 Fahr., although lead base metals give better results at temperatures closer to 900 Fahr. However, the supplier of the bearing metal in question can give specific information as to the best pouring temperature for his product.

It is unwise to overheat babbitt metal because of the loss of metallic constituents. This loss may easily run as high as 5 per cent, and with bearing metals difficult to obtain, it pays to conserve the present supply. Tin, lead, antimony, zinc and copper are commonly used in bearing alloys, and in a molten state some of these metals may oxidize to dross or may perhaps vaporize.

The higher the temperature, the greater the loss. Thus, if the correct mixture of metals is to be maintained in the melting pot, it is wise to heat no hotter nor longer than is absolutely necessary. The layer of oxidized dross that floats on the surface of the molten metal forms a blanket which protects the metal from air and thus retards further oxidation. When pouring from the pot, it is good practice not to remove this protective blanket, but to dam it back at the pouring lip, allowing the clean metal to flow out from under the dam.

Even slight variations in composition of bearing metals can result in widely differing characteristics of bearing shells. Losses due to oxidation or to evaporation may result in a soft, easily deformed alloy. On the other hand, the variations may produce hard brittle metal that checks and cracks easily. Of course, new babbitt, properly handled, gives the most uniform results, and in some mills it has formerly been the practice to use only new babbitt for important, heavily loaded bearings. However, reuse of babbitt is an economical and practical procedure, even on heavy duty bearings, and under present conditions reuse of old metal will probably be demanded.

In most mills, two or three different formulae of babbitt are used for bearings of various types of service. By segregating the discarded babbitt from a reconditioned bearing to its proper group, it can be re-melted and poured for other bearings of the same group. By using care in heating, it can be maintained fairly close to its original formula for several meltings. Eventually, however, it should be relegated for use at points of lesser importance. Some mills have previously made a practice of returning this old, exhausted metal to the babbitt supplier for credit, but whether it is good practice at the present time probably depends on whether new metal can be secured in exchange. Old metal of doubtful formula and sub-standard quality is still better than none at all.

OIL TREATMENT

In modern mills many bearings are lubricated by a circulation of oil. Individual bearings may be ring-oiled from a reservior below each bearing, as in electric motors, or may be splash lubricated by oil thrown from some adjacent moving part, as in gear sets. Groups of bearings may be lubricated by oil circulated from a central reservoir, as in some dryer systems and as in steam turbines. In all of these, the oil is expected to remain in service for long periods of time, perhaps for years.

Assuming the use of a correct type and quality of oil, its service life and the service life of the bearings depend largely upon the manner in which the oil is treated to keep it clean and free of impurities. Where individual bearings and small bath systems are concerned, the expense of treating small quantities of oil makes it impractical to do more than establish a definite schedule for removing the dirty oil and replacing it by clean oil. The intervals between drainings depend upon local conditions. Subsequent use of the drained oil for less exacting requirements depends upon its condition.

In the ordinary filtering and re-conditioning system, water and heavy sediment are removed by gravity settling, or by the use of a centrifuge. Finely suspended solids may be removed by filtering through cloth, clay or other porous materials, or by centrifuging.

In modern paper machines, dryer gears are often enclosed in oil-tight housings and lubricated from the same oil circulation system that lubricates dryer bearings. When used for both dryer bearings and dryer gears, the oil in the circulation system receives severe service because of water contamination and because of the iron rust that gets into the oil. Iron rust acts as a strong catalyst in promoting oxidation. Actual cases of condensation, up to sixteen gallons of water per day, have been noted. Provision should be made to remove and, if possible, to prevent this contamination.

A comparatively recent adaptation of an old idea to a new use is the clay or activated earth filter. When considering such filters, the advice of a lubrication engineer should be secured.

ANTI-FRICTION BEARINGS

Lubrication of anti-friction bearings depends upon fundamentals quite different from those which ordinarily apply to plain bearings. In plain bearings, we try to create separating films of oil between the rubbing parts. In anti-friction bearings, the total area of contact is so small in relation to the load that unbroken separating films cannot be maintained. The only need for lubrication results from the slippage between the balls or rollers, and their cages, and from the slight amount of slippage between the deformed surfaces.

Clearances between the parts of anti-friction bearings are practically zero; hence,

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Fig. 1640 "KING-CLIP"—a sturdy iron body gate valve with internal working parts of bronze, for hard and continuous usage. It has wide application in industry and in many cases will serve as well as a bronze valve.

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TENAX FELTS have the record of standing up under continuous operation. Also when the paper mills are not operating continuously. This latter condition applies especially during the summer months.

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any particles of dirt or grit between balls and raceways cause strains in the metal as the balls force their way past the obstruction.

The presence of solid particles of carbonized oil, or other deposits, therefore, may enormously shorten the life of a bearing. Thus, an important function of the lubricant is to exclude solid material or to flush it out of the active areas. Needless to say, the lubricant itself must be able to resist oxidation and the subsequent formation of deposits. This resistance to oxidation is a vital factor in dryer bearings employing either flood-lubricated or bath-lubricated anti-friction bearings. The high temperatures in back-side bearings of dryers tend to throw down deposits which may decrease anti-friction bearing life.

The life of a bearing also can be shortened by microscopic injury to the hardened and highly polished steel surfaces of balls or raceways. Although these steel parts may be constructed to withstand existing loads and fatigue factors, they can be quickly ruined by only the slightest corrosion or rusting. Thus, where moisture or water is present, the lubricant must serve also to prevent the formation of rust.

Rust prevention within anti-friction bearings is highly important and the method of attack to this problem depends upon the surrounding circumstances.

Where a liberal flow of oil lubricates a bearing, as is the case in a circulation system, any water that enters is carried away quickly by the drained oil. Where only a minute quantity of water enters or remains in a bearing, it is necessary that the water should separate from the oil quickly and so be prevented from reaching the metal. For this condition an oil of high demulsibility is required.

On the other hand, if considerable water collects in the bearings, as may be the case in bath-oiled types of bearings, it is wise to provide a water leg or sump where at least part of this water can drain and settle away from the oil. Even so, some moisture will sooner or later penetrate ordinary oil films and reach the polished steel surfaces, causing corrosion. In such bearings, the oil required is one that will unite with water to form a non-corrosive and tenacious emulsion. For this purpose a properly compounded, easily emulsified oil must be used.

Where water is present outside the bearing, grease may be employed to seal the space between the shaft and the housing to minimize entrance of the water. It is advisable to use a grease that unites with moisture to form an oily emulsion, and thus render any water that does enter the bearing no longer corrosive. Naturally, as the grease emulsifies, it is consumed and so requires periodic replacement. Where water contamination is so severe that an emulsifiable grease is rapidly washed away, it may be necessary to resort to the use of a water resistant grease that does not emulsify.

Improper packing of ball or roller bearings is a common cause of over-heating and failure.

When the bearing space is completely filled with grease, the balls and rollers must force their way through it. It requires considerable energy to force these moving parts through a semi-solid mass of grease, especially at the high speeds at which the parts usually move. This energy does no useful work, but is entirely absorbed in churning the grease and in creating frictional heat. These temperatures in most cases can be reduced to normal by simply removing the greasing plug and permitting the excess grease to escape.

The correct grease filling for anti-friction bearings should be about one-third full in the space occupied by the rotating parts. The grease in the sealing space around and at the sides of the operating area is not in contact with moving balls or rollers and this space should be completely filled.

Since the capacity of a bearing is seldom known by the user, it is most difficult to measure the correct quantity to be fed to each bearing. The most practical method of grease renewal is to remove the greasing plug, pump in new grease until it comes out, and then run the bearing for several minutes. This permits the moving parts to force out all excess grease. The plug should then be replaced. With tight seals and the correct grease in use, the bearing should thereafter be re-greased at about semi-yearly intervals.

Where anti-friction bearings are intended for use in damp or dirty locations, the bearing housings are equipped with tight seals to prevent contamination of the lubricant inside the bearing. Forcing grease into such a bearing under high pressure with a grease gun may burst the seals. When the seals are once ruined grease will

leak out and water will leak in until the seals are repaired. Many leaking bearings and many bearing failures are due to damaged seals caused by careless greasing.

Periodic inspections should be made to determine whether grease seals are tight, whether water is being excluded, and whether grease is being retained where needed. If no grease leaks out, the frequency of grease renewal should be set according to the severity of service.

With correct grease of high quality in use and with tight seals, anti-friction bearings in a paper mill should require repacking only at semi-yearly intervals, for some types of service this period can be lengthened. However, with poor or broken seals, constant checking is required.

The polished steel surfaces of anti-friction bearings roll upon each other with absolutely zero clearance. If impurities of solid character are introduced, it is certain that damage will result. The life of anti-friction bearings can, therefore, be greatly shortened by carelessness in handling the grease during storage and distribution and by failure to keep grease guns clean.

A small metal chip or a few grains of sand on the nozzle of a grease gun, if forced into a costly anti-friction bearing, can ruin it quickly and completely, and the probability is that the real cause of failure will never be appreciated. Cleanliness is one of those matters that can best be turned over to the attention of a good head oiler.

Not only at the guns but at all other points, every precaution should be taken to keep greases absolutely clean. Barrels in the oil storehouse should be kept covered, and where possible, guns should be filled in the storehouse.

It should be recognized that the dispensing equipment should never influence the selection of grease to be employed. After an analysis of operating conditions in the bearings, the correct type of grease should be established. It and the gun should be selected to handle that product.

Too often the guns on hand work hard or not at all with certain greases, and then a different grease is secured—a grease that the guns will handle. After all, it is the bearings that must be lubricated—not the grease guns. In this connection, there are guns available that will pump anything that goes by the name of grease.

OIL STORAGE IN WOOD BARRELS

Oil storehouse keepers have become accustomed to receiving lubricating oil in steel barrels. These containers will withstand considerable abuse and those who handle barrels have come to depend upon the strength and rigidity of the steel type.

Under present priority conditions, it is quite probable that wood barrels may be more or less widely used in the future for lubricating oils.

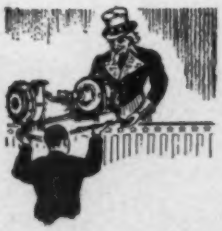
Wood barrels require more careful treatment than is needed for steel barrels, and those who unload and store these barrels should be instructed as to the correct way of handling them and warned as to incorrect methods of procedure.

Wood barrels, if well made and properly handled, are good containers and may be expected to give good service. Most of the

"Devil's Water", they called it, but it didn't harm this MORRIS Pump

See any wear on the impeller or casing of this MORRIS Pump? The photograph was made on opening the pump after 19 years of handling a corrosive and erosive mixture. No repairs or replacements were needed anywhere on the pump.

This is the kind of performance that MORRIS Pump users are accustomed to, even in difficult operating conditions, for MORRIS Pump construction, like MORRIS Pump design, is based on 78 years of experience in building for the "hard-to-handle" services.

WE HAVE ENLISTED  "FOR THE DURATION"

We have placed at the disposal of the Government all our facilities that might be of use in the national war effort. But our remaining facilities are at your service, and also the advice of our engineers to help you secure best results from your present equipment and to plan for your future needs.

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CENTRIFUGAL PUMPS

troubles experienced with them result from the inexperience of those who handle them and are caused by subjecting wood containers to treatment that has come to be almost the every day lot of the steel drum or barrel.

The same rough treatment that will cause a dent in a steel container may leave a wood barrel seemingly unmarked. Inside and well out of sight, however, damage may be done that will cause leakage. Barrels designed to contain petroleum products are made tight by an inner coating of glue. The glue is sufficiently resilient so that the coating will not be injured by ordinary shocks of transportation, but rough treatment will certainly cause breakage. If the glue coating is broken, even slightly, the oil can find its way to the surface of the barrel. The loss of product will be apparent enough, but the actual cause of the difficulty may be hidden to anything save careful examination by an experienced cooper.

A wood barrel should never be permitted to drop, even a few inches. When it is unloaded from a truck or freight car a skid should be used and the barrel should be "eased down" and not permitted to roll or slide freely.

If it is desired to move the barrel, it should be rolled on its bilge, using skids or a conveyor if the distance is more than a few feet, and it should be "eased" to a stop. If it is permitted to bump into another barrel, damage may be done. Damage may also be done by rolling barrels over cobblestones or tracks.

Wood barrels stored in warehouses should be tiered on the bilges on skids and not more than four high. The bungs should be up when the package is finally in place. Skids of 2" x 4" lumber are satisfactory. The inside edge of the skids should rest on the outside edge of the bilge hoops on both ends of the barrel, the 4" surface lying flat on the surface of the barrel. If wood barrels are stored in the open, the heat of the sun may be expected to cause shrinkage and consequent leakage.

Convention Papers . . . Abridged

Chemical Character of Water Available for Pulp, Paper, and Paperboard Manufacture in the United States*

W. D. COLLINS[1]

Because the quantities of water required by units of the pulp, paper, and paperboard industry are of the general order of magnitude of the quantities required for public water supplies (and in many cases much larger), it is practicable to base a discussion of the chemical character of water available for pulp and paper manufacture in the United States on the available information about the chemical character of the waters in actual use for public supplies throughout the United States. Reasonably complete data on the subject are to be found in Water-Supply Paper 658, "The Industrial utility of public water supplies in the United States, 1932," by W. D. Collins, W. L. Lamar, and E. W. Lohr. The heart of this report is a table which gives analyses of the mineral content of some 670 public water supplies which serve about 57,000,000 consumers. The analyses are intended to represent water delivered to consumers, but for most of the supplies there is little difference in concentration and character of dissolved mineral matter between the finished waters and the waters before treatment. The report gives analyses of the untreated waters for nearly all the places where there is any considerable change in composition, as by softening. Of the 56,700,000 consumers whose supplies are represented in the report about 25,600,000 are represented fairly well by one or another of the 5 typical analyses as given in the accompanying table.

Typical Analyses of Surface and Ground Waters

	(Parts per million)				
	1*	2*	3*	4*	5*
Silica (SiO_2)	2.4	12	10	9.4	22
Iron (Fe)	0.14	0.02	0.09	0.2	0.08
Calcium (Ca)	5.8	36	92	96	3.0
Magnesium (Mg)	1.4	8.1	34	27	2.4
Sodium (Na)	1.7	6.5	8.2	183	215
Potassium (K)	0.7	1.2	1.4	18	9.8
Bicarbonate (HCO_3)	14	119	339	334	549
Sulphate (SO_4)	9.7	22	84	121	11
Chloride (Cl)	2.0	13	9.6	280	22
Nitrate (NO_3)	0.54	0.1	13	0.2	0.52
Total dissolved solids	31	165	434	983	564
Total hardness as $CaCO_3$	20	123	369	351	17

* (1) Catskill supply of New York City; (2) Niagara River, filtered for public supply of Niagara Falls, N. Y.; (3) Wells 30 to 60 feet deep used for public supply of Dayton, Ohio; (4) Well, 2,090 feet deep used for public supply Maywood, Ill.; (5) Well 330 feet deep at Smithfield, Va.

Requests are frequently received for a map that will show the probable character of water in all parts of the country. One difficulty in the way of preparing any such map is that at any particular place waters of widely different composition may be found. A surface water from a comparatively small drainage area will have its composition determined by the character of the rock and soil in that area. As the drainage area becomes larger and tributaries from different kinds of rock enter the stream the composition of the water will change. Therefore, the surface water available at a particular place will have its composition determined not by the rocks at the place where the sample is taken but by the average composition of the rocks throughout the area drained by the stream.

The composition of well water at any place may depend upon the depth of the well. In general, the deeper waters carry much more dissolved mineral matter than the shallow waters but at many places there are waters at depths of from 600 to 1000 feet which carry much less dissolved mineral matter than water from a depth of 100 to 200 feet.

Although not a chemical characteristic, the temperature of water is sometimes of significance in the selection of a source for an industrial water supply. A report (Water-Supply Paper 520-F: Temperature of water available for industrial use in the United States, by W. D. Collins, pp. 97-104, 1925) on the temperature of water available for industrial use calls attention to the generally

(*) Published by permission of the Director, Geological Survey, U. S. Department of the Interior, Washington, D. C.

(1) Chemist in Charge, Quality of Water Division, U. S. Geological Survey, Washington, D. C.

This is the seventh installment of abridgments of papers presented at the annual meeting of the **Technical Association of he Pulp and Paper Industry,** held in New York City, February 16-19, 1942. Previous installments have appeared consecutively in the March, April May, June, July, and August issues, and will be continued in succeeding issues.

recognized facts that ground water is usually reasonably constant in temperature and that surface waters vary in temperature with the seasons.

The Measurement and Influence of Fiber Length*

JAMES d'A. CLARK, Research Associate
The Institute of Paper Chemistry

It is suggested that for the purposes of length measurement, a fiber be defined as an element of fibrous material, having a length of over 0.10 mm. and a projected area of over 0.10 x 0.01 mm., so that a fine thread or fiber 5μ wide would need to be at least 0.2 mm. long to be included. This latter provision is somewhat more arbitrary, being based on the consideration that an exceedingly fine thread is too weak to contribute appreciably to strength by virtue of its length; it does so rather by its presence as an adhesive filler.

Because, in practice, pulp is always measured or blended by weight and, as will be shown later, the properties of a mixture of two pulps of different lengths depend upon the weighted average of the lengths by weight and not by number, the average fiber length of a pulp should refer to the weighted average length by true weight as far as possible. Furthermore, using a weighted average by weight has the effect of minimizing the presence of the shorter fibers, so that whether we stop at 0.1 mm., more or less, makes little difference.

At present, the best means that we have of measuring the average fiber length by weight is the division of a pulp into a series of fractions (as many as is practicable) by means of a pulp classifier, finding the percentage by weight of each fraction, determining the average fiber length by weight of each fraction (for which an approximation must serve) and then dividing the sum of these products by 100.

As a result of a number of experiments it was found that, for most practical purposes, the ratio of the weighted average fiber length by weight to the numerical average fiber length could be taken to be 12.5 per cent for the intermediate fractions from a classifier having a series of screens with 20, 35, 60 and 150 meshes per inch. Moreover, it was found that the average lengths of the intermediate fractions were practically constant for all the pulps examined and later work has disclosed that little error would be made by assessing the values of 1.75, 1.00, and 0.55 mm. for the weighted average fiber lengths of the intermediate fractions of at least all coniferous chemical pulps and using a figure of 0.05 mm. as the average weighted length of the "debris" or "through 150 mesh" fraction. The weighted average length of the longest fraction cannot be assumed, as this clearly depends upon the type of pulp and its degree of beating. The weighted average length of the debris probably also increases with beating, but, in general, the effect of this fine fraction

(*) A portion of a thesis submitted in partial fulfillment of the requirements of The Institute of Paper Chemistry for the degree of Doctor of Philosophy from Lawrence College, Appleton, Wisconsin, June, 1941.

Paper is as Essential as Gunpowder; Amsco Alloy Saves Critical Metals in its Production . . . . . .

The Chinese are credited with the invention of paper and gunpowder and, at least in modern times, both have proved indispensable to the conduct of war. Aside from the reams of paper required for war industry correspondence, government releases and morale-building posters, there are scores of other vital uses—32 tons of paper for blueprints are required for the construction of a single battleship and more tons of it go into the actual building.

Amsco Alloy can help conserve hard-to-get metals used in the production of paper. A grade of Amsco Alloy, designated F-12, can be used to replace shorter-lived metals that can be used more efficiently elsewhere. F-12 is a chromium-nickel alloy developed to resist the heat and corrosion encountered in digesters. It is the sulfite paper mills' own alloy, conforming strictly to T.A.P.P.I. specifications.

Besides saving metal because of its long life under corrosion, economy of operation results from its load-carrying strength at high temperatures; and from its ready machinability and moderate first cost.

Parts such as steam nozzles, relief fittings, sleeves, elbows, blow valve bodies, wedges and seat rings, gauge glass plugs and fittings, may be readily cast from Amsco Alloy F-12 with metal sections minimized to further metal conservation.

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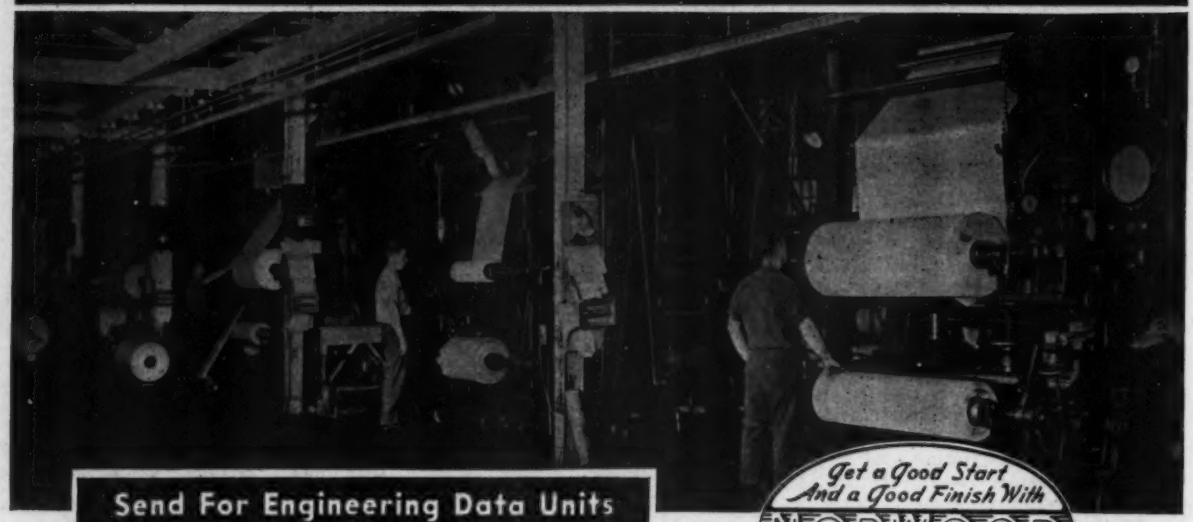

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on the weighted average length of the whole pulp is so small that no appreciable error would result if the average lengths of the debris were taken to be 0.05, 0.1, and 0.2 mm. for moderately beaten pulp, well beaten pulp, and groundwood, respectively.

Graff and Miller (Graff, John H., and Miller, R. W., *Paper Trade J.* 109 No. 6:31-37, Aug. 10, 1939; *Tech. Assoc. Papers* 22:445-451, 1939) have given an excellent summary of various methods employed to measure fiber lengths, including a detailed description of an accurate microscopical method developed by Graff. However, as this method takes at least one and one-half hours to complete, a new projection method was developed by which over 200 fibers in a sample may be accurately measured and recorded in less than half that time.

In brief, the new method is as follows: A dilute suspension of the sample (about 0.1 gram per liter) is prepared and, using a 6-mm. diameter pipette made of glass tubing with a small rubber bulb at one end, about 4 cc. of the suspension is transferred to a special cell. This cell is made from a piece of flawless glass on which an annular ring of metal or glass 6 or 8 cm. in diameter and about 1 cm. deep is cemented. The inner sides of the ring, if made of glass, preferably should be painted with a water repellent (aluminum stearate solution is excellent), so as to keep the surface of the suspension fairly flat. Two or three cc. of a 0.5 per cent solution of locust bean gum in water is added to the fibers in the cell. The solution is made by heating one gram of gum in 200 cc. water to 80 C. with stirring and, after cooling, adding a few drops of formaldehyde as a preservative. The function of the gum is twofold: it not only disperses but also immobilizes the suspended fibers, thus making the procedure both convenient and accurate.

The cell and fibers are then placed in a vertical projection apparatus, the magnification of which has been previously accurately adjusted so that a pair of parallel lines on a slide 5.0 ± 0.01 mm. apart exactly coincide with two sides of a four-inch square (subdivided into one-inch squares) drawn on the horizontal screen.

On the screen is placed a piece of semi-transparent manifold paper about 8 by 10.5 inches which has been ruled lengthwise with a parallel series of light pencil lines about ¼ inch apart, and with a pair of heavier parallel lines at the top and bottom of the sheet exactly 10 inches apart.

After adjusting the focus, if necessary, to secure sharp images of the fibers, the following procedure is recommended: Starting at the upper left-hand one-inch square ruled on the screen, move the paper so that the tip of a fiber coincides with the point at the top left-hand corner of the paper where the lines intersect. Move the paper so that the light line coincides as nearly as possible with the fiber being measured. If the fiber curves away from the line, rest the point of a sharp hard pencil at the place on the light line where the curvature starts and, using the pencil point as a pivot, push or pull the paper until more of the fiber coincides with the line; then move the pencil point to the place where the fiber curves off again. In this way, the image of any fiber, no matter how curled, may be accurately straightened out. Mark the light line with a stroke where the other end of the fiber stops and proceed to record the length of the next fiber. Do this in turn for every fiber which has an end lying in the top right-hand square and which has more than one-half of its length inside the four-inch square. Proceed to the second top left-hand square and record the lengths of all the fibers whose ends lie there and which do not originate in the first square. Similarly, record all the fibers in each of the 16 squares which have more than half of their lengths lying in the big square and omit only those whose image is 2 mm. or less long, corresponding to those shorter than 0.1 mm., or those fiber particles having an image area of less than 0.1 by 10 sq. mm. When dealing with classified pulp, other than the very fine fractions, ignore the presence of tiny or very short fibers, even longer than this if only one or two are visible in several four-inch square fields.

When the bottom of a light line is reached on a fiber, note the place on the fiber by making a mark, if necessary, on the screen; then move the paper up to the top of the next line and continue. Marks made on the screen for this purpose should be erased as soon as possible.

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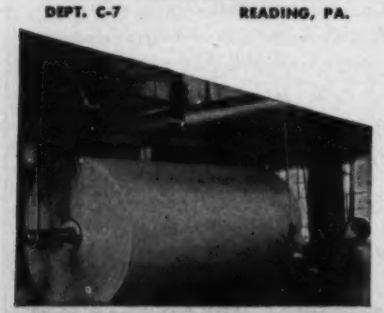

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Without looking at the screen, move the cell to a new position. Again record all the fibers lying more than one-half within the four-inch square, counting the fibers mentally as they are recorded and writing on the paper against the mark of the end of the last fiber examined in each four-inch square field, the number of fibers in that field. In each way record the lengths of about 200 fibers, which, if of average length, will be found in about 10 fields.

Measure the total length of the fibers recorded by counting the number of 10-inch lines filled and measuring the length of the partially filled final line, and divide the total length in inches by the magnification factor (0.8 with the specified conditions) and by the number of fibers examined to obtain their average length in mm.

If desired, the longest and shortest fibers may be picked out from the record and marked to be measured individually.

It will be seen that with this procedure, if care is taken to dilute the pulp sample to an accurately known volume and if an accurate quantity of this suspension is transferred to the cell for examination, an estimate of the "titer," or length of fiber per gram of pulp, may be obtained easily from the total length of all the fibers examined, the number of fields employed is of greater value as a measurement of the average fiber width, which of course requires a microscope; and this is only one of several factors, including the thickness of the fiber and its lumen, which influence the "fineness."

Fiber length is a fundamental measurement of pulp quality and has an important bearing on sheet properties which, previously, has not been isolated from the commonly associated property of fiber fineness. It appears that tensile strength and sheet rigidity are proportional to $L^{1/2}$ (where L is the weighted average fiber length by weight), the bursting strength is proportional to L, and the tearing resistance to $L^{3/2}$.

Further work on the relationship between fiber length and other sheet properties and tests remains to be done.

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JAMES d'A. CLARK, Research Associate
The Institute of Paper Chemistry

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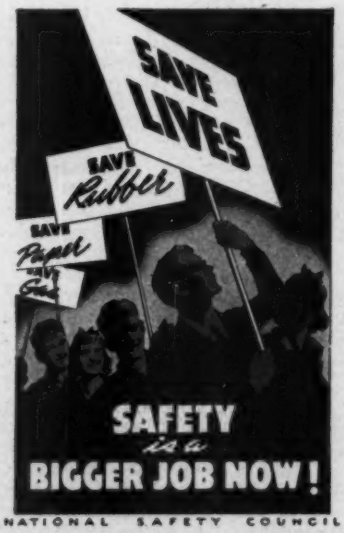

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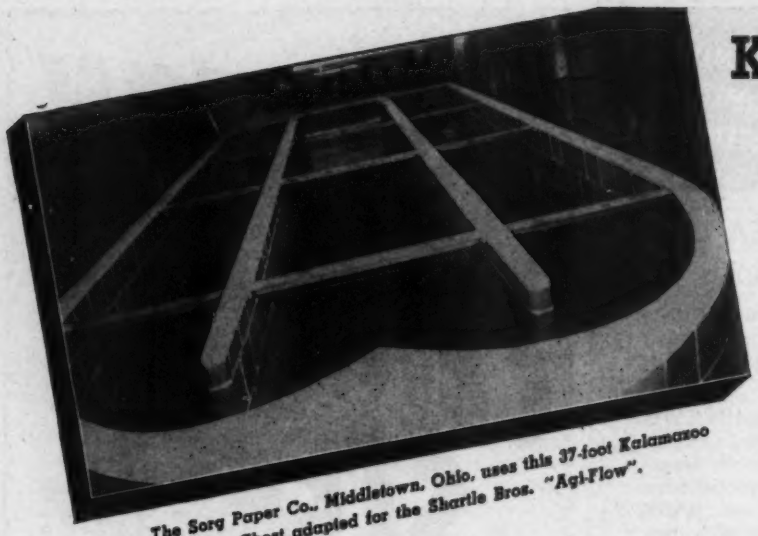

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WOOD

water Relationship in Papermaking." Canada, Dept. of the Interior, Forest Service, Bulletin 84, 1933), we have the micro-equivalent of a piece of unshorn velvet cloth with a tufted uneven pile of coarse and fine fibers. The surfaces inside the pile are not exposed in the ordinary sense; nor are any voids in or covered over by the pile a part of the outside surface. This comprises only the externally exposed sides and ends of the fibrils or tufts of micels or the sides of crevices and undulations forming the exterior of the fibrous structure.

Bell (Bell, J. H. *World's Paper Trade Rev.* 102:1456, 1934) has rightly stated as regards discussions concerning the nature of beating and hydration "that the issue will not be definitely settled until we have a precise measurement of the changes during beating of the external specific surface of the fiber."

When the work was started, an attempt was made to find a way of applying a uniform coating of some suitable material on the surfaces of the fibers and to measure the exposed area by obtaining the initial rate of solution of the coating. Silver was chosen as the most likely material for the purpose and the first step was the development of a satisfactory method of depositing a continuous and adhering coat on the fibers but meanwhile avoiding formation of unattached silver particles and debris. A number of glass silvering formulas were tried and modified without success. The best results were secured by dehydrating the pulp with alcohol, drying, moistening with a reducing sugar solution, and

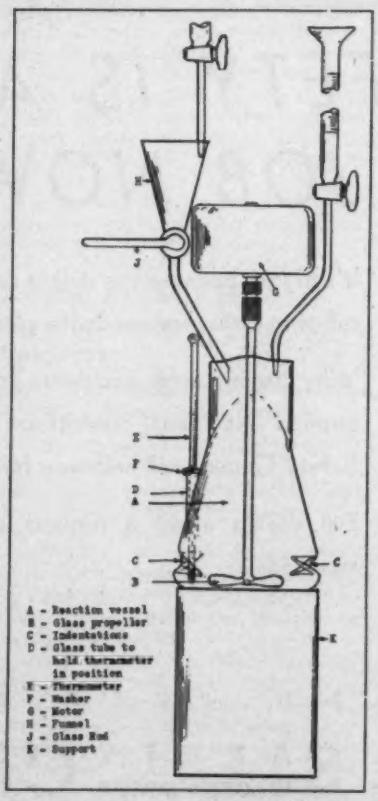

Fig. 1—Specific surface reaction apparatus.

silvering in the cold with a Rochelle salt-ammonia-silver nitrate solution.

Fortunately, another approach was suggested; namely, the employment of the catalytic action of a silver surface on the decomposition of hydrogen peroxide. This was all the more desirable because experiments subsequently proved that it was not possible to deposit a uniform thickness of silver on different kinds of cellulosic surfaces, because it appeared that the metal would be preferentially deposited first on those fiber surfaces that were the most strongly reducing. When once a deposit had formed, it was found that silver continued to be deposited almost exclusively on the surfaces already covered, which was not entirely prevented even when the concentration of the fibers relative to the silvering solution was made very low.

The chemical nature of the action of silver is not well understood. Cronheim (Cronheim, George, *J. Phys. Chem.* 45:328-340, especially p. 331-333, 1941) has recently reviewed the action of metals and their hydroxides on hydrogen peroxide. Mellor (Mellor, J. W. "A Comprehensive Treatise of Inorganic and Theoretical Chemistry." Vol. I especially p. 936-949, 1927) noted that many chemicals, including ammonia, cyanides, and sulphuric acid, act as poisons for the reaction and the effects of these and other chemicals, including potassium permanganate (which is employed during the new procedure), were confirmed. Sulphuric acid, however, appears to inhibit the reaction, not by poisoning in the ordinary sense, but by low-

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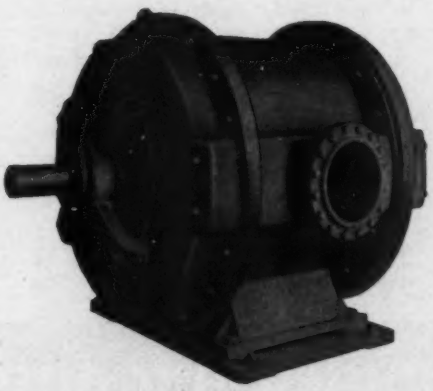

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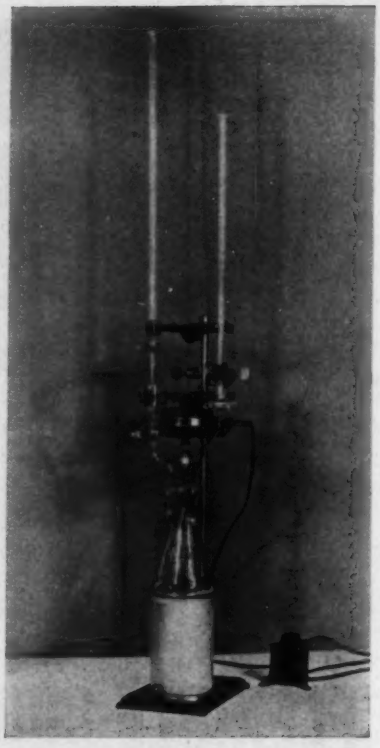

Figure 2

ering the pH, because the reaction can be started again by adding a suitable alkali. A trace of the others, if added to a suspension of silvered fibers in water, will almost entirely prevent a reaction when dilute hydrogen peroxide is subsequently added.

In the new method of measurement, a thin continuous film of metallic silver, about 0.1 mμ thick, is deposited on all the exposed surfaces of a small (about 100 mg.) representative sample of the pulp by boiling the fibers in about 150 cc. of an ammoniacal silver nitrate solution for 10 to 30 minutes, the time depending inversely on their reducing properties. The silvering solution is prepared by very carefully adding ammonia to a 4 per cent solution of c. p. silver nitrate until the color of the brown precipitate lightens and just barely disappears. A measured volume of the washed and silvered fiber suspension (containing an accurately known weight of fiber, about 20 mg. or less) is diluted to exactly 100 cc. with distilled water after adding 5 cc. of sodium borate buffer solution (25 grams hydrated sodium borate and 20 cc. N sodium hydroxide diluted to 500 cc.).

The fiber mixture is poured into the reaction flask of the apparatus shown in Figures 1 and 2. Twenty-five cc. of hydrogen peroxide solution, the concentration of which has been carefully adjusted against approximately 0.5 N potassium permanganate, is run into the closed addition funnel. The stirrer motor is started and the cock of the addition funnel is opened suddenly, allowing the hydrogen peroxide to run into the flask and a stop watch is started. The hydrogen peroxide is catalytically decomposed in direct proportion to the extent of the silvered surface present. The silver coating remains intact so that the reaction is independent of either the weight or of the thickness of the silver deposit.

After about 50 seconds, the thermometer is read and after closing the cock, 15 cc.

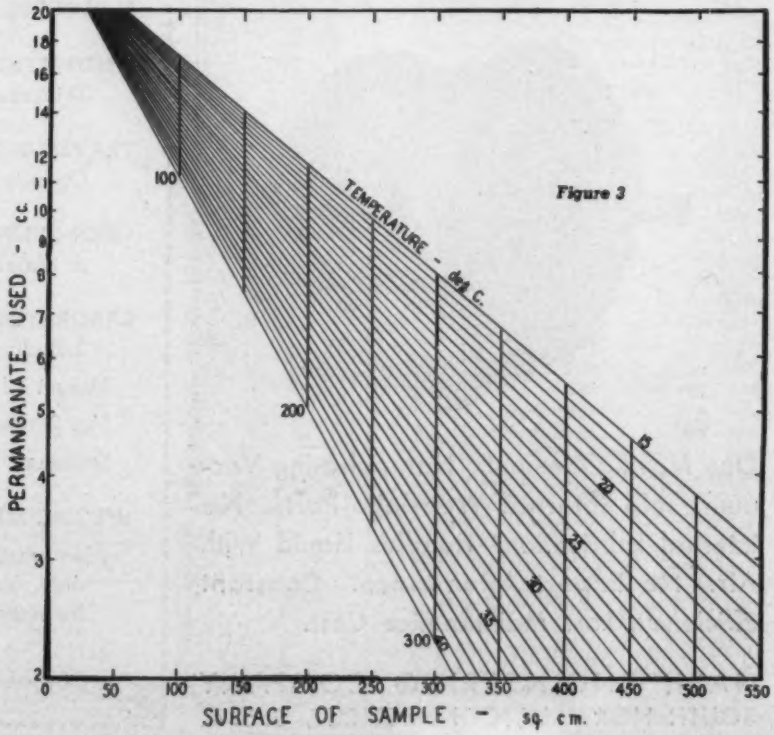

Figure 3

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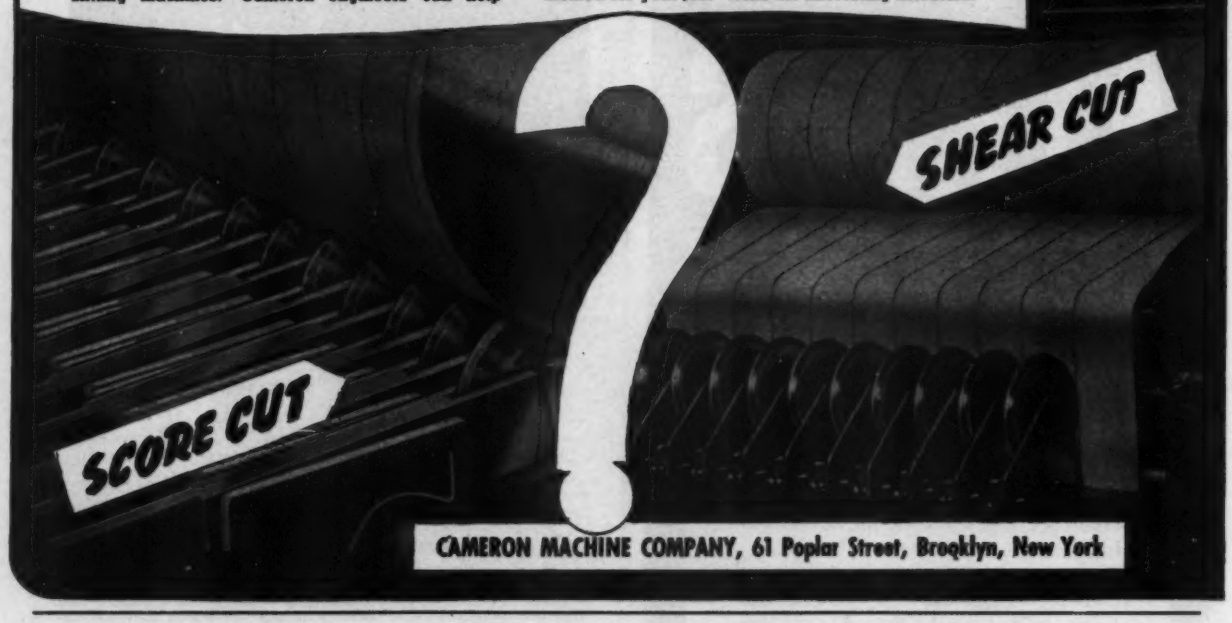

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of 2 N sulphuric acid is poured into the addition funnel. At the end of exactly 100 seconds the cock is quickly opened and the reaction is stopped by the addition of the acid to the suspension. The unused hydrogen peroxide is found by titrating the contents of the flask directly with 0.5 N potassium permanganate to a faint pink end point. The area of the sample tested is determined by a formula or chart (Figure 3) which has been prepared for the chosen conditions of the method by applying the identical procedure to finely cut Cellophane sheets of known area.

The specific surface is obtained by dividing the area so found by the weight of the sample. Because of the danger of catalytic poisoning, care must be taken to have all parts of the equipment scrupulously clean.

Brief descriptions of several of the more informative and interesting experiments carried out during the course of this work are presented herewith.

Fifty mg. portions of unbeaten unbleached Mitscherlich sulphite pulp were silvered for progressively increasing times with 150 cc. of boiling ammoniacal silver nitrate solution. The fibers became yellow in a few seconds, light brown at the end of one minute, red brown after two minutes, deep brown after three minutes, chocolate at four minutes and, apparently, quite black at the end of six minutes as light coming through the suspension no longer reflected a brownish tinge. Silvering of individual samples was continued up to 35 minutes.

After testing each sample of pulp for area according to the method described, concentrated nitric acid was added to the reaction mixture and the amount of silver present was determined by titrating the solution with 0.1 N potassium thiocyanate, using ferric ammonium sulphate as an indicator. One cc. of 0.1 N potassium thiocyanate is equivalent to 0.00103 cc. of silver metal. Knowing the exposed area, the thicknesses of the silvered coats can be calculated.

Once the pulp has become black, there is only a minor increase in the measured specific surface even where the pulp was silvered six times longer than was necessary. Indeed in this case the fibers become quite brittle after silvering for 20 minutes and very brittle, silver gray, and powdery after 35 minutes. By using a fine filter for the washing, almost all the fine fragments were retained to contribute their quota of area to the results.

The following are some of the results obtained with the new method:

Pulp	sq. cm./g.
Southern pine kraft, unbleached, unbeaten	6400
Rag halfstuff	7900
Southern gum sulphate, bleached, unbeaten	9400
Swedish sulphite, unbleached, unbeaten	12000
Mitscherlich sulphite, unbleached, unbeaten	10300
Disintegrated, 20 min.	13700
Fine groundwood	18600
Commercial stock-sulphite-groundwood mixture (beaten)	31000
Same, from machine headbox (containing whitewater)	47000
West coast sulphite, bleached, unbeaten	8800
West coast sulphite, beaten 4 r.p.g.*	10700
West coast sulphite, beaten 8 r.p.g.	12100
West coast sulphite, beaten 32 r.p.g.	13600
West coast sulphite, beaten 64 r.p.g.	17200

(*) r.p.g. refers to revolutions per gram, a unit of beating, in the Clark laboratory kollergang.

The application of this method to an evaluation of the various ideas advanced to explain the phenomenon of beating will be discussed in a later paper. In the meantime, however, attention is invited to the presence of the extremely fine fibrils even on unbeaten fibers as was claimed by Strachan (Strachan, James, Proc. Tech. Sect., Papermakers' Assoc. Gr. Brit. & Ireland 6:139-167, 1925-26; *Ibid.* 13:61-81, 1932-33; and 14:447-451, 1933-34) and which has long awaited confirmation, and also to the very rapid increase in the specific surface of pulp after being mildly treated corresponding to the accompanying rapid increase in strength.

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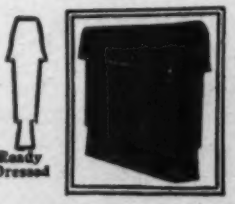
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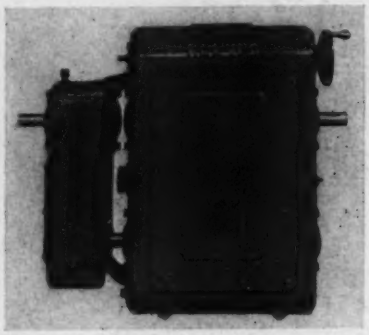
NEW EQUIPMENT AND SUPPLIES

Variable Speed Transmission with Chain Drive Reducer

Reeves Pulley Co., Columbus, Ind., has announced an enclosed design of variable speed transmission which is equipped with built-in chain reducer, and with output shaft in exact alignment with input shaft. The chain drive operates in a bath of oil.

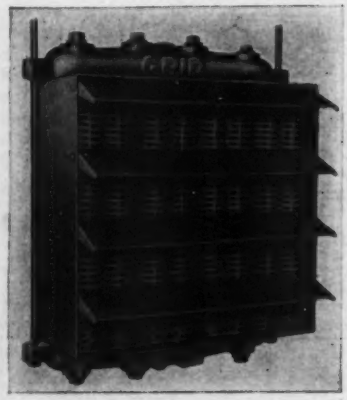


Infinitely variable output speeds, within predetermined limits, may be obtained by turning the speed control handwheel.

The unit illustrated was designed for vertical operation with oil drain and filler located accordingly.

Unit Heater

The unit heater, designated as the *Grid*, manufactured by the D. J. Murray Mfg. Co., Wausau, Wis., is being made with cast iron heating sections instead of aluminum as formerly. Designed to withstand up to 250 lb. steam pressure, this new unit, for the present, will be made in eight sizes.



Photoelectric Intrusion Protection System

Photoswitch, Inc., 21 Chestnut St., Cambridge, Mass., has announced a long range photoelectric control, the *Type A28L Control*, for protection of plants against intruders or saboteurs. The light source of the control projects a practically invisible light beam for distances of 350 to 700 ft. If the light beam is broken, the photoelectric control contacts close, thereby sounding alarms, operating a central station system, turning on flood lights, closing gates, etc.

The control is provided with a latching unit, including a push button station, which

may be located in the gate house, office, or other convenient point. This unit serves to latch the alarm in operation once the light beam has been broken momentarily until the reset button is operated.

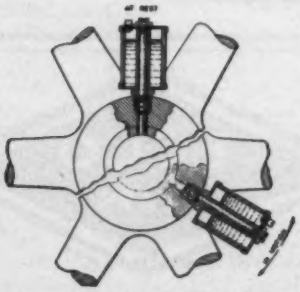
Unaffected by changes in local light, and designed to operate 24 hr. a day, the control operates from a 115 volt a-c. source of supply.

New Type of Glass

Pittsburgh Corning Corp., Grant Bldg., Pittsburgh, has announced a new type of glass that is opaque, so light in weight that it floats like cork, rigid, odorless, fireproof and verminproof. Known as *Foamglas*, this product has a cellular structure containing myriad tiny air-tight cells which give it buoyancy and valuable insulating properties. It is available in slabs 12 in. by 18 in. and in thicknesses of 2 in., 3 in., 4½ in., and 6 in. The slabs can be sawed or drilled with ordinary tools.

Loose Pulley Oiler

A wick type lubricator for use on loose pulleys, idler pulleys, clutches, eccentrics, and similar rotating machine parts has been announced by the Oil-Rite Corp., 3466



S. 13th St., Milwaukee, Wis. The lubricator consists of an oil reservoir of glass, mounted on a hollow metal stem. This stem is sealed from the oil in the reservoir, except for two small ports at the very top. Inside the stem is a cylindrical felt wick which extends through the pulley hub to rest directly on the shaft. A compression spring, wrapped around the wick, holds the wick firmly in position against the shaft.

As the pulley rotates, and the lubricator with it, centrifugal force throws the oil against the top of the reservoir, and into the two ports in the stem. These ports admit oil to the wick, which filters out dirt and sediment, and conducts the oil directly to the face of the shaft.

A small plug, controlling the area of the oil ports, regulates the amount of oil to be delivered to the shaft. The reservoir is filled from the top.

The lubricator is available in five standard sizes (capacities from ¼ to 2½ oz.) for standard tappings from ⅛ to ¼ in.

Filter-Crucible for Paper Laboratories

The Selas Co., Scientific Equipment Division, Erie Ave. and D St., Philadelphia, has introduced a porcelain filter-crucible in which the base is a permanent porous-ceramic filtering element capable of quantitative fiber retention along with extremely

fast flow. A ceramic material, designated as *"XF,"* constitutes the glazed-in filtering disc. The crucible is available in sizes of 60, 40, 30, and 20 ml. volume.

According to the supplier, fiber retained on the crucible base may be repeatedly ashed (to incandescence if necessary) over a Bunsen burner without damaging the crucible.

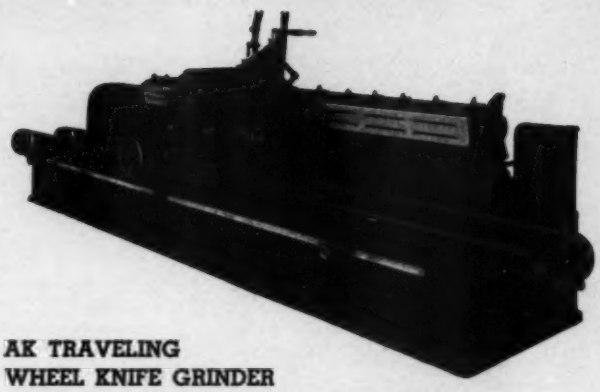
Air-Cooled Transformer

A 2400-volt, air-cooled, industrial transformer has been announced by The Acme Electric & Mfg. Co., Cuba, N. Y. This unit is available in sizes from 1.5 kv.-a. in single phase design and from 3 kv.-a. to 30 kv.-a. in three phase designs. The three phase designs can be furnished with primaries of 240/480 and 600 volts.

Plastic Pipe

A plastic pipe, manufactured in the same dimensions as extra strong steel pipe of 2 in. OD or less, has been announced by the Dow Chemical Co., Midland, Mich. Made of a new thermoplastic resin, known as Saran, the pipe is unaffected by water, and only a few solvents exhibit any adverse

COVEL HANCHETT KNIFE GRINDERS



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Cast iron takes the place of aluminum for the heating sections, to cooperate with the war effort in using substitute materials—but it's still the ultimate in unit heater quality.

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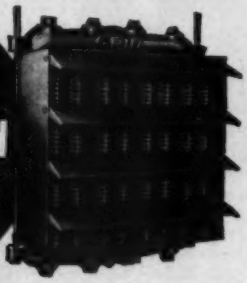

THE new Grid is engineered along the same lines as the Grid Unit with aluminum heating sections—dependable, long life unit. A special design for performance. Patent applied for. No corrosion — no leaks or breakdowns . . . In this new Grid Unit there is only one type metal in contact with steam or hot water. There is nothing to cause electrolysis that produces corrosion. Engineered and constructed to withstand up to 250 lb. steam pressure. Ask for details now.

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effects on it. It can be cut with a wood or hack saw, threaded with ordinary pipe dies, welded, and heated and bent. In welding, pieces are placed on a hot plate and heated to 350-400 Fahr. and held until molten material appears. Then the pieces are placed together in proper posi-

tion, pressed firmly, and allowed to cool for 10 seconds. The manufacturer states that the resultant weld has greater joint strength than the pipe itself; that the pipe is non-scaling, withstands freezing, and resists heat excellently up to 175 Fahr., also the base resin from which the pipe is made is odorless, tasteless, and non-toxic.

Three-Way Butterfly Valve

R-S Products Corp., Wayne Junction, Philadelphia, has announced a three-way butterfly valve, designed for mixing and quick interchange service, and adapted to automatic control by means of an air diaphragm motor or hydraulic cylinder. The valve is constructed of cast steel or cast iron for pressures up to 600 psi. When desirable, special metals for resistance against heat, abrasion, and corrosion can be substituted. The valve is equipped with a self-cleaning, double-beveled, streamlined vane which seats wedge-tight against

Patent Applied For

the valve body, thus producing a tight shut-off as well as positive control of volume and pressure. For inaccessible locations, a reach rod with de-clutching unit is provided for automatic operation or manual control in case of power failure.

*p*H Testing Set

La Motte Chemical Products Co., Towson, Baltimore, Md., has announced a *p*H testing set that requires less than 0.5 ml. of sample to make a determination, the accuracy of the test being plus or minus 0.1 of a *p*H. The standard set covers a *p*H range of 5.2 to 8.6, and is available in a compact case which includes necessary glassware, indicators, and instructions. The manufacturer states that turbidity and color in sample does not interfere with the making of a *p*H determination with this set, and that an actual determination can be made in one minute or less.

Fabric Permeability Tester

Cambridge Instrument Co., Inc., Grand Central Terminal, New York City, has announced the development of an instrument, the *Fabric Permeameter*, for determining the rate of diffusion of hydrogen and other gases through fabrics. The sample of fabric to be tested is clamped between two recessed test plates, thereby forming an upper and lower compartment. Hydrogen is passed into the lower compartment, while the upper compartment, which is filled with clean dry air, communicates with the metering unit. The hydrogen which permeates through the fabric contaminates the air in the upper compartment, and thus changes its thermal conductivity. A measure of the rate of this contamination provides a measure of the ability of the fabric to hold gas.

The metering unit in the test plate assembly is connected through a control box to a portable spot galvanometer, calibrated to read directly in hydrogen leakage in liters per square meter per 24 hours.

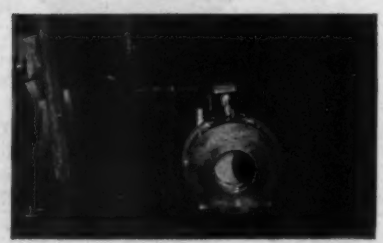
To prevent leakage of the gas along the layers of textile, and to determine accurately the area being tested, the sample is prepared for the test by being clamped between the two co-axial discs and the edge dipped into a hot sealing mixture.

Plastic Fittings for Tubing

Acadia Synthetic Products Division, Western Felt Works, 4115 Ogden Ave., Chicago, has announced a line of plastic fittings, molded from Saran, for use on either plastic or metal tubing in sizes from ⅛ in. to ⅜ OD. The manufacturer states that the fittings have a high tensile and bursting strength, are non-corroding, non-aging, and, being non-conductors of electricity, galvanic couples are not formed.

Paper Stock Valve

Nekoosa Foundry and Machine Works, Inc., Nekoosa, Wis., has announced the *Finegan Ball Valve* for use in paper stock lines and for other services in a paper mill. The valve may be constructed of bronze, stainless steel, steel, or cast iron. Where advisable, seat and ball may be plated with chromium. Among the operating features



of the valve, suggested by the manufacturer, are the following: (1) It will not clog; (2) the higher the pressure against the ball, the tighter it seals against the seat; (3) the ball and seat may be adjusted without taking valve out of line; (4) it allows full pipe size opening with no pockets for deposit; and (5) the seat is always covered, both when opened and closed.

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We take into account the nature of the stock, its consistency, the piping layout, and all the other factors that enter into your operating conditions. And, each FREDERICK stock pump is engineered especially to meet the specific conditions under which it must operate.

Consequently, FREDERICK pumps are considered the unit for low cost, high efficiency pumping by leading paper mills who have used them for many years . . . and who know the soundness of FREDERICK construction and the dependability of FREDERICK operation.

★ Remember, FREDERICK is the pump that is *GUARANTEED* to meet fully the operating conditions for which it is sold!

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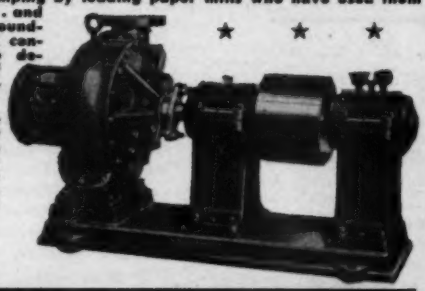

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TECHNICAL DEVELOPMENTS

These abstracts are of the latest developments found in the American and foreign press.

Rice Straw Pulped with Nitric Acid

Rice straw pulp made by the use of nitric acid contained 0.4 per cent ash, 9.8 per cent pentosans, 88.8 per cent alpha cellulose, and had a copper number of 1.08 and a degree of polymerization (d.p.) of 900. This was compared with a sulphite pulp (from a conifer) which contained 0.24 per cent ash, 5.29 per cent pentosans, 87.7 per cent alpha cellulose, and had a copper number of 1.37 and d.p. of 1,050.

Both pulps were steeped in mercerizing alkali for varying time periods which affected the yields. After the removal of alkali by washing, the regenerated cellulose, dissolved in phosphoric acid, gave viscosities which showed no great differences between samples of different origin. After xanthation, however, the rice straw pulp showed by far the lower viscosity and coagulation took longer. Either pulp proved satisfactory and gave good threads when spun, although the threads from rice straw were not as white as those from sulphite pulp. Isao Schimoda and Masao Kono, Cellulose Ind. (Japan) 17, No. 6, B 42-4 (1941) through Bull. Institute Paper Chem. 12, No. 11, 360 (1942).

Effects of Various Reagents on Cotton and Pulp

That a determination of the degree of polymerization is insufficient to characterize cellulosic materials has recently been shown by Staudinger. In a study of cellulose of various origins (none of which was ever dissolved and reprecipitated) the present author used raw and kiered cotton and subjected these to the following treatments: (1) boiling with 1 per cent hydrogen peroxide for 1-10 hours; (2) boiling with 0.1*N* sulphuric acid for 1-10 hours; (3) treatment with 2 per cent potassium dichromate solution at 60 deg. for 1-5 hours. At intervals in each series of experiments, test samples were removed, thoroughly washed and dried at 70-100 deg. and examined for swelling in water and alkali, and for solubility in various "solvents." The drop in d.p. was also noted. In general, after hydrogen peroxide treatment there was little change in swelling in water, but a marked increase in swelling in alkali, an increase in alkali and calcium thiocyanate solubility, and at the end of the 10 hour time period, a complete solubility in sodium zincate. Solubility in a reagent consisting of a mixture of formic and calcium chloride is extremely light. In the last named reagent, untreated or mildly treated cotton actually increased in weight very slightly, due perhaps to formylation. Only after extensive oxidation is there a slight decrease in weight. Acid treatment of the cottons showed no marked change in swelling, a slight increase in alkali solubility (most marked with raw cotton after 0.5-1 hour), marked increases in calcium thiocyanate and sodium zincate solubilities and a slight solubility increase in the formic acid-calcium chloride reagent.

A dissolving pulp containing 88 per cent alpha cellulose was treated as follows: (1) boiled with 1 per cent hydrogen peroxide solution; (2) converted to alkali cellulose, and allowed to age 1-140 hours at 20 deg. with subsequent regeneration of the cellulose; (3) treatment as in (2) except that hydrogen peroxide was added to the alkali cellulose during the aging periods; (4) oxidized with 2 per cent dichromate in dilute sulphuric acid for 1-5 hours at 60 C. In the case of (1) there was a marked increase in alkali swelling and alkali solubility, and complete solubility after one hour in calcium thiocyanate and a great increase in sodium zincate solubility. Solubility in the formic acid-calcium chloride reagent also increased markedly. In the case of (2) alkali swelling increased rather slightly, so did swelling in water. Solubility in calcium thiocyanate increased very slightly, and somewhat irregularly with time, but there was great increase in zincate solubility. The solubility in formic-calcium chloride also showed increases. In the case of (3) a similar picture was presented, although here the addition of peroxide greatly accelerated the aging reaction. In 8 hours this reagent gave rise to a product the properties of which were almost identical with those of the product obtained in (2) after 92 hours. Case (4) caused a marked increase in alkali swelling and solubility, sharp increases in calcium thiocyanate and sodium zincate solubilities, but no marked change in formic acid-calcium chloride solubilities.

The author also submitted linters, dissolving pulp, and a very high grade (96 per cent alpha) pulp to 4-72 hour treatment with glacial acetic-sulphuric acid at 30-40 deg. at 2 per cent concentrations (a term which is not further defined and which is therefore not clear). This treatment caused a marked increase in alkali solubility with time (up to 30-36 per cent); a decided increase in thiocyanate and zincate solubilities, and a very sharp increase in the solubility in formic-calcium chloride solution. The latter were respectively (for linters, 88 per cent alpha, and 96 per cent alpha pulps), 26.7 per cent, 30.4 per cent, and 47 per cent maximum. For a specific degree of polymerization the pulps are more soluble in a given reagent than are the linters. An interesting point brought out by the author is that the formic acid-calcium chloride reagent dissolves completely, hydrated cellulose that has been obtained by solution and reprecipitation. It dissolves only in part a fibrous native cellulose (or pulp) even when such a substance has been subjected to widespread degradation. In this way it serves to show differences in origin between these two forms—not indicated by thiocyanate or zincate, and should be a valuable reagent. The article contains 19 photomicrographs, 16 tables and 9 graphs. Arnold Marschall, Jentgens Kunstseide u Zellwolle 23, No. 5, 160-73 (May 1941).

Saving of Critical Materials in Canada

Recently the Technical Section of the Canadian Pulp and Paper Association sent out a questionnaire asking mills how to reduce the consumption of critical materials by the use of substitutes. Sixteen mills replied, and a summary of their experience is given in detail, which cannot be reproduced in an abstract. Fifty-eight service items are listed. A few of them follow, and are given simply as interesting examples:—Penchlor cement was used satisfactorily in place of glycerine and litharge in patching acid tower linings; copper sulphate was used in place of chlorine in slime prevention (with somewhat lower efficacy); masonite was used successfully in lining boxes used for soap mixtures in place of sheet copper or galvanized iron; "wooden dutchmen" soaked in paraffin successfully replaced lead dutchmen in stock and white water lines; methyl cellulose substituted glycerine in stencil and stamp pad ink. In the case of certain critical metals and alloys, careful salvaging is practiced. This is especially true of bronze and special steels. For other items the original should be consulted. Anon. Pulp and Paper Magazine of Canada, Vol. 43, No. 9, 689-92 (1942).

End Point of a Sulphite Cook

This was attempted by making suitable tests on the sulphite cooking liquor drawn from three different digesters (without cooling) each of which was operating to produce a pulp of a certain hardness. The liquors were analyzed for SO_2, *p*H, density, the Mitscherlich test, transparency, and also by determining alpha-lignosulphonic acid by the benzidine hydrochloride method of Rassow and Kraft. The latter gave the only value that could be correlated with hardness, and contrary to the statement of Rassow and Kraft, no maximum value for the acid was found. It increased continuously as the cook progressed. Attempts to correlate this determination with the Enso bleach number are shown in various graphs. Although the lignosulphonic acid could be determined in 15 minutes, it was not used as an end point, since there were wide variations in chip filling between one cook and the next. A 3 per cent variation, it seemed, changed the Enso number from 5.5 to 4.1 even when the digestions were halted at the same lignosulphonic acid value. Ernst Sundstrom, Finnish Timber J. 23, 73-8, 98, 100, 102; Svensk Papperstidn. 44, 201 (1941); through C. A. 36, 4333-4 (1942).

TOUGH!
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Engineering & Machine Co.
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YOUR HOIST

• Although WRIGHT HOIST are built with load-carrying factors much in excess of their rated capacities, like many other well-made pieces of mechanical equipment built for specific duty, they should not be overloaded. Overloading is dangerous—to men, materials, machinery and steady production. Abuse to machinery, today, is akin to sabotage.

WATCH THE BOTTOM HOOK

• Wright load hooks are drop-forged from special steel which, when subjected to excessive overloading, gives visible warning by opening slowly. When the bottom hook has started to open, look to the top hook, too, for while it is stronger than the bottom hook, it also may be reaching a danger point.

WATCH THE LOAD CHAIN

• WRIGHT HOIST load chains are electrically welded from special analysis steel, exceptionally high in tensile strength and elastic limit. Chains that are excessively overloaded will stretch out of pitch, thus preventing proper fit with precision load wheel pockets. This results in destructive wear to both chain and load wheel. Keep your chains well-lubricated for long life.

Victory demands all out efficiency in production. Victory demands speed. Victory demands steel. Abuse of machinery wastes all three. Take proper care of your WRIGHT HOIST so that it lasts. You can find the name of your nearest Wright distributor in the telephone book.

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York, Pa., Chicago, San Francisco, New York

In Business for Your Safety

AMERICAN CHAIN & CABLE COMPANY, Inc.
BRIDGEPORT - CONNECTICUT

PAPERMAKING PATENTS

IN THE UNITED STATES — Compiled by James Atkins, Registered Patent Attorney

Inquiries should be addressed to James Atkins, Munsey Building, Washington, D. C.

Method of Making Paper

Patent No. 2,275,776. Gerould T. Lane and Wendell Butterfield, Rochester, N. Y., assignors to Eastman Kodak Company, a corporation of New Jersey. Original application May 18, 1937, Serial No. 143,336. Divided and this application January 22, 1938, Serial No. 186,408. 1 Claim. (Cl. 92—43). A method of forming a sheet of paper with moisture containing stuff which comprises dividing a viscous flow of stuff into a plurality of confined shallow streams, each of which is subdivided into a plurality of streams of less width than the sheet to be formed, and flowing all of the confined streams at the same speed toward a support, and gradually bringing one series of shallow streams after another into contact with a support while drawing moisture therefrom.

Apparatus for Treating Paper Stock

Patent No. 2,265,936. Edwin Cowles, Cayuga, N. Y., assignor to The Cowles Company, Princeton, N. J., a corporation of New Jersey. Application March 18, 1940, Serial No. 324,684. 11 Claims. (Cl. 259—96). Apparatus of the character described, comprising, in combination, a tank, said tank having a chamber in the bottom thereof, an impeller located in said chamber and adapted to rotate in a horizontal plane, the periphery of said impeller being spaced from the sides of said chamber to provide a passage therebetween, said chamber having an outlet opening for the removal of material from the tank, and means forming part of said impeller adapted upon rotation thereof to discharge material horizontally across the entrance to said passage.

Paper Manufacture

Patent No. 2,277,477. Cliff R. Crawford, Hamilton, Ohio, assignor to The Black-Clawson Company, Hamilton, Ohio, a corporation of Ohio. Application August 17, 1939, Serial No. 290,588. 2 Claims. (Cl. 92—37). Paper stock handling apparatus of the character described comprising a tank having an end wall and a substantially vertical baffle extending from the end wall to a point spaced from the opposite end of the tank and providing for the circulation of stock in a path of substantially horseshoe form from a supply zone at one side of the baffle to a discharge zone along side of the supply zone at the other side of the baffle, said tank having a horizontally extending trough at an elevated location extending from side to side of the tank and across the supply zone and the discharge zone, said trough having an adjustable wall above the supply zone over which stock flows throughout substantially the entire width of the supply zone onto the stock in the tank and having a second adjustable wall over the discharge zone over which stock flows throughout substantially the entire width of the discharge zone onto the stock in the tank, and means for withdrawing stock from the discharge zone at one side of the baffle and forcing it up into said trough at the other side of the baffle.

Safety Knife Bar Latch for Paper Cutters

Patent No. 2,254,467. Freeman Barney, Spring Lake, Mich., assignor to The Challenge Machinery Company, Grand Haven, Mich., a corporation of Michigan. Application August 19, 1940, Serial No. 353,184. 5 Claims. (Cl. 192—131). The combination with a paper cutter having a frame, a knife bar and knife and means for actuating the knife manipulated by one hand of the operator, of a safety latch comprising a body pivoted to said frame adjacent the path of the knife bar, a shoulder on said body adapted to move under the knife bar to prevent downward movement thereof, spring means acting to move said shoulder under said knife bar and a finger grip by which the latch may be released from said knife bar under tension of said spring means.

Mixing Tank

Patent No. 2,270,847. Howard Davison Hyman, Ottawa, Ontario, Canada, assignor to J. R. Booth, Limited, Ottawa, Ontario, Canada, a corporation of Canada. Application March 27, 1941, Serial No. 385,482. In Canada January 27, 1941. 8 Claims. (Cl. 259—95). Circulating and mixing apparatus for paper pulp stock and the like comprising a tank having a partition dividing said tank into two vertical compartments communicating with each other at the top, a valve controlled outlet communicating with both compartments of the tank and located at the lowest point of said tank, all portions of the bottom of the tank having a downward slope toward said outlet, said partition having an opening in its lower portion through which said compartments are placed in communication and located adjacent to said valve controlled outlet, and a rotary impeller arranged in said opening.

Drain Box for Papermaking Machines

Patent No. 2,274,654. Earl E. Berry, Beloit, Wis., assignor to Beloit Iron Works, Beloit, Wis., a corporation of Wisconsin. Original application March 27, 1936, Serial No. 71,109. Divided and this application May 3, 1937, Serial No. 140,299. 12 Claims. (Cl. 92—51). A white water drain box for paper machines adapted for mounting within the loop of the paper machine forming wire comprising an open topped box having a plurality of partition walls extending thereacross to define chambers within the box, said walls terminating above the bottom of the box, slides cooperating with the bottom portion of at least some of the partition walls to regulate the size of the open space beneath said walls, and means operable from outside of the box for raising and lowering the slides.

Compressed Wadding Roll

Patent No. 2,270,043. Charles A. Fourness, Appleton, and Rudolf A. Moravek, Neenah, Wis., assignors to Paper Patents Company, Neenah, Wis., a corporation of Wisconsin. Application February 13, 1939, Serial No. 256,242. 1 Claim. (Cl. 206—59). As a new article of manufacture, a strip of compressed cellulose wadding wound upon itself in the form of a roll, said wadding comprising a plurality of superposed plies of thin creped tissue wherein the creping corrugations extend transversely of the strip, are pressed together in a direction lengthwise of the strip and are under pressure exerted in said direction, the material being sufficiently resilient so that said creping corrugations tend to separate and the strip tends to expand longitudinally, and means encircling the wound roll for holding said pressure and preventing said expansion.

Method of and Apparatus for Couching

Patent No. 2,278,526. John P. Rich, Nashua, N. H., assignor to Improved Paper Machinery Corporation, Nashua, N. H., a corporation of Maine. Application April 17, 1939, Serial No. 268,355. 4 Claims. (Cl. 210—199). An apparatus of the class described comprising a filter drum on which a mat of semi-solid material may be deposited, a couch roll adapted to compress this mat of semi-solid material, a driving motor of substantially fixed speed for all load conditions, for driving the filter drum, and a motor having a substantially constant torque and a variable speed range, for driving the couch roll with a substantially uniform driving torque over a definite speed variation range.

Paper Making Apparatus

Patent No. 2,274,852. John A. Spencer South Hadley Falls, Mass., assignor to Spencer Specialties Inc., South Hadley Falls, Mass., a corporation of Massachusetts. Application June 22, 1939, Serial No. 280,592. 3 Claims. (Cl. 92—48). The combination of the Fourdrinier wire, dandy roll thereover having a shaft rotatably supported, and a positively driven member rotatable in synchronism with said wire of a paper making machine with means for driving said dandy roll from said member comprising, drive means including a drive shaft journalled for rotation in substantial alignment with said dandy roll shaft, a drive unit including change speed mechanism and output and input shafts, operative connections between said output shaft and said drive shaft, electrical apparatus having an output shaft connected to said input shaft of the unit and an input shaft, and operable connections between said rotatable member and the input shaft of said electrical apparatus, all adapted and arranged whereby said dandy roll is rotated in synchronism with the wire at all of its speeds.

WANTED—Single fold interleaving towel machine 10¾ inch, in good operating condition. Address Box 314, Fritz Publications.

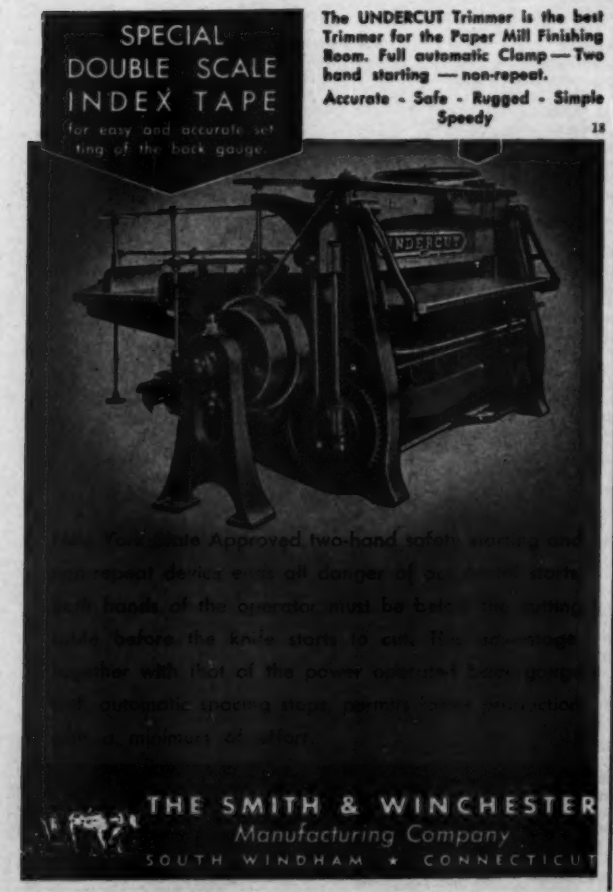
WANTED—Two to four paper machine dryers 48" dia. × 156-162" face. Address Box 315, Fritz Publications.

POSITION WANTED—Plant Engineer or Master Mechanic. 22 years in pulp and paper mill. 20 years in one position. Desire new permanent location. My record is good. Can furnish best of references. Address Box 316, Fritz Publications.

WANTED—Used paper equipment: 1½ lb. or 5 lb. Valley Iron Works Niagara Beater (with washer cylinder), Reihle-Quinn Compression Tester, Mullen Tester, Handsheet-making Equipment (form, couch rolls, drying rings, and plates), Sheet Drier, Hydraulic Sheet Press, etc. Write, giving pertinent information. Address Box 317, Fritz Publications.

HELP WANTED—Sales and Service Engineer—A nationally recognized firm of consulting engineers requires a chemical or mechanical engineer with experience in all phases of water treatment including boiler feedwater as applied to paper mill operation. The position pays a salary commensurate with ability in both selling and servicing clients. Some travel from permanent headquarters in Wisconsin will be required. Applications submitted should be in detail with all pertinent facts to receive immediate consideration. Address Box 318, Fritz Publications.

ENGINEER—Phila. manufacturer of recording control instruments desires to employ several instrument application engineers. Applicants should be familiar with the practice and theory of industrial pulp preparation and paper making and with the construction and use of available instruments and control devices. Must be capable of visualizing practical needs for devices not yet available. A good education in physics or in chemical engineering considered essential. Applicants must be U. S. Citizens. Reply to A-8, P. O. Box 3575, Phila., Pa.



The UNDERCUT Trimmer is the best Trimmer for the Paper Mill Finishing Room. Full automatic Clamp — Two hand starting — non-repeat.

Accurate - Safe - Rugged - Simple Speedy

18

New York State Approved two-hand safety starting and non-repeat device eliminates all danger of accidental starts. Both hands of the operator must be back of the cutting line before the knife starts to cut. This advantage together with that of the power operated back gauge with automatic spacing steps, permits faster production with a minimum of effort.

HIGH ACHIEVEMENT IN WAR PRODUCTION

On August 25th, with appropriate ceremonies, the Army and Navy E Production Award was presented to the Stickle organization—the Army and Navy E Flag to be flown above the plant and the Army and Navy E Pin to be worn by each member of the Stickle production team. This award, and the right to display and wear its symbols, comes to this organization as a result of "exceeding all production expectations" in the delivery of equipment to facilitate the war effort. In informing us of the award, Undersecretary of War Robert P. Patterson wrote that members "of the Stickle Steam Specialties Company have every reason to be proud of their great work in backing up our soldiers on the fighting fronts." We—management and workers alike—are proud and exceeding glad.

HIGH ACHIEVEMENT IN INDUSTRIAL SERVICE

★ The production achievement for which this award has been made relates to the delivery of standard items of Stickle Equipment, which for many years, has proved its worthiness in superior performance in paper mills and other industrial plants across the continent in the United States and Canada. Knowing the satisfaction it has given to private enterprise, we are confident that it will do its part in service for the Army, as Stickle workers have done their part in making it available when required.

We continue our service to the paper industry in all ways permitted under present war regulations.

BETTER DRAINAGE AND BETTER DRYING FOR PAPER MILLS

STICKLE

STEAM SPECIALTIES COMPANY

2225 Valley Avenue, INDIANAPOLIS, INDIANA

SPECIALIZING FOR 35 YEARS IN REDUCING THE COST OF STEAM

New Catalogues, Ass'n Reports, and Publications

Allis-Chalmers Mfg. Co., Milwaukee, Wis.—This company has just published a new handbook entitled, "Plain Facts on Wartime Care of Rubber V-belts." It begins with the anatomy of a V-belt and principle of the V-belt drive and ends with discussions about actual damaged V-belts. How to obtain proper V-belt tension, what to do about worn sheaves, and what determines the life-expectancy of V-belts are covered in detail. This handbook applies to all makes of V-belts and is available without charge on request.

American Arbitration Association, New York City—Available without cost to corporations, unions, and attorneys is the association's new booklet "Labor Arbitration in Wartime." Included in the publication is a series of 7 labor arbitration clauses which are recommended to parties to labor agreements, these having been prepared after consultation with a group of Impartial Chairmen serving more than 20 of the largest industries. Also included are summaries of approximately 200 typical grievances that have been submitted to arbitration.

Blackmer Pump Co., Grand Rapids, Mich.—A new general catalogue has just been issued by Blackmer. Data concerning the background and applications of the five basic units, power pumps (industrial service), power pumps (marine service), sanitary pumps, truck pumps, and hand pumps, is given in a very comprehensive manner. All types are completely illustrated.

Buell Engrg. Co., Inc., New York City—"The Buell van Tongeren System of Industrial Dust Recovery" is the title of this company's newest publication. It was prepared under the supervision of Buell engineers and with the assistance of the Buell dust testing laboratory. The booklet is intended as a guide in the selection of the dust recovery equipment best suited to particular needs. Major problems of modern dust recovery and the practical methods for their solution are thoroughly discussed.

Certified Gauge & Instrument Corp., Long Island City—A recent publication very clearly illustrates and describes the various types of gauges manufactured by this company. Specifications and data are given under the headings of Super-Test, U.S. Navy, Long-Life, Net Price, and Standard—all types of Certified gauges. The patented cam and roller movement is also explained and pictured.

Chain Belt Co., Milwaukee, Wis.—Bulletin No. 409 has just been issued by Chain Belt describing the Rex spray nozzles and their uses in various industries, including the pulp and paper industry, where they are used extensively for the continuous washing of logs, pulp screens, or paper felts. The nozzle itself is described as a non-clogging device which throws a flat fan-like spray with such force that it removes dirt and grit. The bulletin will be sent on request to anyone interested.

Cochrane Corp., Philadelphia — This company's complete flow meter line is described in detail in a recently published 56-page catalogue. Well illustrated, it includes electric, mechanical, linameter (area), ring balance, liquid level, and weir meters. The catalogue also covers the new 2 pen electric flow recorder with ratio indicating pointer, an improved low pressure electric type meter, and high pressure ring balance meter.

Ernst Carrier Sales Co., Buffalo, N. Y.—A new folder by this company contains complete information on Ernst drum and barrel carriers. It is arranged under such descriptive titles as "What It Does," "How It Works," "Where It's Used," and "Who Uses It." The last page lists the complete line of carriers.

General Electric Co., Schenectady, N. Y.—A quick-selection and comprehensive chart of electronic tubes for industry, with technical data on applications and tubes, has been prepared by Radio, Television and Electronics Department of this company. The technical data on each tube is given in tabular form, simplifying the selection of the tube to fit a particular requirement. This chart is available on request.

B. F. Goodrich Co., Akron, Ohio—This company has just published a 36-page "Rubber Guide Book for American War Industries." In a very condensed form the application and properties of many types of products for industrial and aeronautical purposes using natural, synthetic, or reclaimed rubber are listed. Available on request. Goodrich has also published a catalogue section (No. 2158) on belt vulcanizers, one of the important adjuncts to rubber belt conservation. It gives all pertinent details on the type of construction of its vulcanizers, dimensions, capacity, and the type of current necessary to operate them. It also is available upon request.

Ideal Commutator Dresser Co., Sycamore, Ill.—A recent publication gives the latest facts about Ideal machine tool accessories and their part in saving time, speeding production, and keeping costs down. Among the accessories described are live centers, the metal etcher, demagnetizer, grinding wheel dresser, etc.

International Nickel Co., Inc., New York City—"Heat Transfer Through Metallic Walls" is the title of a 16-page booklet published recently from data prepared by the Development & Research Division of this company. It includes information in formulae for determining overall heat transfer rates, the various factors influencing heat transfer through metallic walls, and the thermal conductivities of metals and alloys commonly used in the construction of process equipment.

Manning, Maxwell & Moore, Inc., Bridgeport, Conn.—A 72-page "New Employees' Booklet," pocket-size, has just been published by this company. It is divided into five main sections as follows: Employment, Health and Safety, For Your Benefit, General, and Your Company, and includes answers to practically every kind of a problem that confronts a new employee. Photographs of the key executives of the company are included, as well as a place for the worker to fill in data such as social security number, group insurance, etc.

New Jersey Zinc Co., New York City—Volume 3, No. 2 of "Paint Progress" contains as its feature article the use of white paint in blackouts. With street lighting reduced to a minimum, municipal authorities are being forced to consider other means of providing for the safety of both motorist and pedestrian during such periods; hence this article discussing the painting of street intersections, curbings, and various street obstructions with white paint for better visibility, is most timely. Other important subjects covered are the use of zinc dust paint for protection against rust, and the value of paints which reflect both natural and artificial light, thus improving conditions for men in industry.

Pennsylvania Salt Mfg. Co., Philadelphia, Pa.—Booklet No. 6 on "Penchlor Acid-Proof Cement" has just been released by this company. It presents recent data togther with photographs and charts showing installations and methods of installation. The "how to use" section has been brought up to date, while chemical, physical, and electrical properties are presented in complete detail. Available upon request.

South Bend Lathe Works, South Bend, Ind.—"How to Cut Screw Threads in the Lathe," a 21-page booklet covering the cutting of screw threads on back-geared screw-cutting lathes, has just been reprinted by the South Bend Lathe Works. The first portion of the book is devoted to the setting up of a lathe for thread cutting, including the use of quick change gear box to obtain the pitch of thread desired. Complete information is given on the various types of lathe tools employed in cutting screw threads, how to grind them, and how they should be mounted and positioned. Copies of this booklet (Bulletin No. 36-A) can be obtained by writing Department P5 of the company. Price 10c, postpaid.

Carl Schleicher & Schnell Co., New York City—A recent bulletin of this company contains information on six grades of their American made laboratory filter papers: three grades of "ash-low," and three grades of "ash-free." Some test data on laboratory filter papers is also given.

Toledo Scale Co., Toledo, Ohio—A new 4-page leaflet has just been published by this company describing its line of floor scales. Profusely illustrated, the pamphlet shows typical floor scale installations and has cut-out sketches of structural features. It also lists additional equipment which may be employed in conjunction with the various models to meet special requirements. Copies are available upon request.

Book

Statistical Abstract of the United States, 1941—Compiled under the supervision of Calvert L. Dedrick, Chief Statistician, Statistical Research, Bureau of the Census, by Kathleen H. Dugan, Editor, this sixty-third number of the Abstract contains statistics relating to the social and economic condition of the population and to the industrial, commercial, and governmental activities of the Nation. The statistical tables are compilations of data collected by the various statistical agencies of the Federal Government, by several State agencies, and by a considerable number of nongovernmental organizations. It is a volume of 1,056 pages, bound in buckram, and is available through the Superintendent of Documents, Government Printing Office, Washington, D. C. at $1.50 per copy.

Association Reports

All of the orders which affect the industry emanate from the OPA and WPB and clear through the office of E. W. Tinker, executive secretary of the American Paper and Pulp Association. Copies of all government orders are sent by the Association to members. Listed below are releases sent out during August by the APPA. Any correspondence with that office regarding these releases should carry identifying listing and numbers under "Legislation and Public Affairs."

National Defense No. 190—Amendment No. 3 to Priorities Regulation No. 11.

National Defense No. 191—Amendment 1 to Schedule IV and Amendment 1 to Schedule V to Limitation Order L-120.

National Defense No. 194—Transportation—General Order O.D.T. No. 18, Maximum Loading of Freight Cars.

National Defense No. 196—Amendment No. 2 to Wood Pulp Order M-93.

National Defense No. 199—Informative Bulletin No. 20.

Conservation Practice Nos. 14, 15 and 16.

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CAST • ROLLED • FABRICATED

IS SUCCESSFULLY USED FOR

Digester Neck Rings • Blow-off Valves
Digester Bottom Sleeves • Acid Valves
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Strainers • Fittings • Acid Pumps • Piping

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Heat and Corrosion Resistant Alloys

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1992 GUOIN STREET, DETROIT, MICHIGAN

PULP and PAPER MILL
Screens
Precision perforations in all sizes for large production and screen durability
Copper * Steel
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5654 Fillmore St., Chicago, Ill. 114 Liberty St., New York, N. Y.

SIMONDS Circular Cutters
Slitting Cutters—Scoring Blades and Slotting Segments—accurately made—long lived—for many types of machines.

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FITCHBURG, MASS.
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238 First St. San Francisco, Cal.
1350 Columbia Road, Boston, Mass.
620 First Ave., South Seattle, Wash.
311 S. W. First Ave. Portland, Ore.

CURRENT MARKET QUOTATIONS

RAGS (Domestic)
f.o.b. New York City

NEW RAGS — *per cwt.*

Blue Overalls	5.25 to 5.50
Corduroy	2.75 to 3.00
Cottons—	
Washables, No. 1	2.75 to 3.00
Fancy Percales	4.25 to 4.50
New Soft Blacks	3.75 to 4.00
New Light Seconds	2.75 to 3.00
New Dark Seconds	2.50 to 2.75
Khaki Cuttings—	
Mixed	3.00 to 3.25
O. D.	3.75 to 4.00
New White Canvas	6.50 to 6.75
New Mixed Blacks	2.75 to 3.00
Shirt Cuttings—	
New White No. 1	6.50 to 6.75
Silesias No. 1	5.00 to 5.25
New Unbleached	6.75 to 7.00
Fancy	3.50 to 3.75
Linen Cuttings—	
White	14.00 to 14.50
Grey	13.50 to 14.00

RAGS (Domestic)
f. o. b. New York City

OLD RAGS

OPA ceiling prices in sales to consuming mills f. o. b. cars at points of shipment, with brokers' allowances of $1 to $2 a ton depending on the value of the grade involved.

	per ton
Roofing—	
No. 1	31.00
No. 2	29.00
No. 3 and No. 4	27.00
Twos and Blues—	
Repacked	44.00
Thirds and Blues—	
Repacked	44.00
Miscellaneous	36.00
Whites, No. 1—	
Repacked	76.00
Miscellaneous	64.00
Whites, No. 2—	
Repacked	58.00
Miscellaneous	53.00

RAGS (Foreign)
ex dock New York City

NEW RAGS — *per cwt.*

New Dark Cuttings
New Mixed Cuttings
New Light Silesias
Light Flannelettes — Nominal
Unbleached Cuttings
New White Cuttings
New Light Oxfords
New Light Prints

RAGS (Foreign)
ex dock New York City

OLD RAGS — *per cwt.*

No. 1 White Linens
No. 2 White Linens
No. 3 White Linens
No. 4 White Linens
No. 1 White Cottons
No. 2 White Cottons
No. 3 White Cottons
No. 4 White Cottons
Extra Light Prints
Ord. Light Prints — Nominal
Med. Light Prints
Dutch Blue Cottons
French Blue Cottons
French Blue Linens
Checks and Blues
Linsey Garments
Dark Cottons
Old Shoppers

ROPE and BAGGING
f. o. b. and ex dock New York City

Gunny No. 1—	*per cwt.*
Foreign	Nominal
Domestic	4.50 to 4.75
Wool Tares—	*per cwt.*
Light	4.00 to 4.25
Heavy	4.25 to 4.50
No. 1 Scrap Bagging	3.75 to 4.00
Manila Rope—	
Foreign	—
Domestic	*115.00-
New Burlap Cuttings	5.75 to 6.00
Jute Threads—	
Foreign (Nom.)	6.25 to 6.75
Domestic	5.50 to 6.00
Strings—	
Sisal	4.00 to 4.25
Soft Jute	4.50 to 4.75
Mixed	1.25 to 1.50

*OPA ceiling price per ton f. o. b. shipping point.

WASTE PAPER
F. O. B. New York City

Shavings—	*per ton*
White Env. Cuts, One-Cut	67.50-
Hard White Env. Cuts	62.50-
Hard White, Unruled	57.50-
Hard White, Ruled	50.00-
Soft White, One-Cut	57.50-
Soft White, Misc.	43.00-
Fly Leaf, No. 1	33.50-
Fly Leaf, No. 2	22.50-
Fly Leaf, Woody, No. 1	25.00-
No. 2 Mixed Col. Woody	18.00-
Mixed Colored	15.00-
Flat Stock—	
Overissue Magazines	18.00 to 19.00
No. 1 Heavy Magazines	16.00 to 17.00
Mixed Books	10.00 to 11.00
Ledger Stock—	
No. 1 White	30.00 to 31.00
No. 1 Mixed (Colored)	25.00 to 26.00
Manilas—	
New Env. Cuttings	58.00-
New Env. Cuts, One-Cut	57.50-
Extra Manilas	37.00-
Manila Tab Cards, Free of Ground Wood	45.00-
Colored Manila Tab Cards, Free of Ground Wood	30.00-
Ground Wood Manila Tab Cards	27.00-
Ground Wood Manila Tab Cards, Colored	20.00-
Kraft—	
Envelope Cuttings	65.00-
Mixed Env. or Bag Cuts	55.00-
Tripled Sorted No. 1 Brown	50.00-
New 100% Cor. Cuts	35.00 to 36.00
No. 1 Old Assorted	29.00 to 30.00
News—	
White Blank	26.00 to 27.00
Overissue	9.00 to 10.00
No. 1 Baled	8.00 to 9.00
Old Corrugated Boxes	9.00 to 10.00
New Corrugated Cuts	11.00 to 12.00
Box Board Chips	4.50 to 5.50
No. 1 Mixed Paper	4.50 to 5.50

CHEMICALS
f. o. b. shipping point

Alum (Papermakers)—	
Lump, cwt.	4.25-
Ground, cwt.	4.00-
Powdered, cwt.	4.40-
Blanc Fixe—	
Pulp, bulk, ton	40.00 to 46.50
Dry, barrels, pound	06.00 to -
Bleaching Powder—	
Drums, cwt.	2.25 to 3.10
Casein (Domestic Standard)—	
20-30 mesh (bags), lb.	17.00 to 18.00
80-100 mesh (bags), lb.	18.00 to 19.00
Argentine, lb.	—
China Clay—	
Domestic Filler	
Bulk (mine) ton	7.50 to 15.00
Domestic Coating	
Bulk (mine) ton	12.00 to 22.00
Imported (ship side)	
Bulk (lump) ton	18.00 to 28.00
Chlorine—	
Tank cars (wks) cwt.	2.00 to 2.25
Gelatine (silicin), lb.	.90 to .95
Glyc. (C.P.) drums, lb.	18.25 to 18.75
Litharge, powd., bbl., lb.	.09 to -
Rosin (Gum)—	
New York, per 100 lbs.	
E	3.40-
F	3.40-
G	3.50-
WW	3.70-
Rosin (Wood), carlots	3.05-
Salt Cake—	
Dom. bulk (wks) ton	15.00 to 16.00
Imp. bulks on dock—	
(Atl. ports) ton (Nom.)	20.00 to
Soda Ash—	
Bulk (works), cwt.	.90 to .95
Paper Bags, cwt.	1.05 to 1.35
Barrels, cwt.	1.05 to 1.35
Soda (Caustic)—	
Solid, drums, cwt.	2.30 -
Ground and flake, drums, cwt.	2.70 -
Sodium Silicate—	
60 deg., 55 gal. drums, (works) cwt.	1.65 to 2.05
40 deg., 35 gal. drums, (works) cwt.	.80 to 1.45
Starch—	
Pearl, 140 lb. bags, cwt.	3.10-
Pearl, barrels, cwt.	3.20-
Paper (Sp.) bags, cwt.	3.20-
barrels, cwt.	3.20-
Sulphur (crude)—	
(mine) bulk, long ton	16.00 to 20.50
Talc—	
Dom. 100 lb. bags (mine) ton	15.00 to 21.00
Imp. bulk, ton (Nom.)	—
Titanium Dioxide—	
Barium Pig., bbls., lb.	.05¾ to .06
Calcium Pig., bbls., lb.	.05 to .05¼
Zinc Sulphide, bbls., lb.	.08¼ to .08½

WOOD PULP

OPA maximum prices applicable to wood pulp delivered to consumer mills located East of the Continental Divide exclusive of Denver, Colo.:

Bleached softwood sulphite	76.00
Unbleached softwood sulphite	66.00
Bleached hardwood sulphite	73.50
Unbleached hardwood sulphite	63.50
Bleached Mitscherlich sulphite	81.00
Unbleached Mitscherlich sulphite	72.00
Northern bleached sulphate	86.00
Southern bleached sulphate	79.00
Northern semi-bleached sulphate	82.00
Southern semi-bleached sulphate	75.00
Standard news print siderums	46.00
Northern unbleached sulphate	73.00
Southern unbleached sulphate	63.50
Bleached soda pulp	66.00
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Boards—	*per ton*
Binders	84.00-
Chip	37.50-
Chip, sgl. mls. lined	52.50-
Coated, white patent	
.016	90.00-
.020 and heavier	75.00-
Kraft liner	60.00-
News	37.50-
Book (coated)	*per cwt.*
No. 1 Coated	15.50-
No. 2 Coated	14.00-
No. 3 Coated	13.25-
No. 4 Coated	12.75-
No. 2 Offset	11.00-
A Grade Super	10.75-
B Grade Super	10.25-
Bonds (Rag Content)—	
100% Rag	*per cwt.*
Ext. No. 1	42.00 to 46.00
100% Rag	35.00 to 37.75
85% Rag	
75% Rag	26.00 to 29.00
65% Rag	
50% Rag	20.80 to 22.75
25% Rag	18.20 to 20.00
Regular Colors	1.00 cwt. extra
Bonds (Sulphite)—	*per cwt.*
No. 1	11.70-
No. 2	10.75-
No. 4	9.90-
Colors	1.00 cwt. extra
Glassine (f. o. b. mill)—	*per cwt.*
Embossed (25 lb. up)	13.75 to 14.25
Bleached (25 lb. up)	12.75 to 13.25
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Ledgers (Rag Content)—	
100% Rag	*per cwt.*
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75% Rag	28.15 to 30.50
65% Rag	22.80 to 27.75
50% Rag	22.10 to 24.25
25% Rag	19.50 to 21.50
Regular Colors	1.00 cwt. extra
Ledgers (Sulphite)—	*per cwt.*
No. 1	13.00-
No. 2	12.05-
No. 4	11.20-
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Rolls (Spot)	(nominal)
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White, No. 2	1.00-
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Manila	.90 to .95
Napkins, semi-crepe (12½ lb. to M shts.) per cs.	.60-
Napkins, full crepe and emb'sed (12½ lb. to M shts.) per cs.	.60-
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Toilet, Unbleached (M shts.) per cs.	4.25-
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Unbleached	2.60 to 3.05
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Super-Standard	5.00-
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